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ABSTRACT

The Objective-Item Bank presented covers 16 sections of four subject areas in each of four grade levels. The four areas are: Language Arts, Math, Social Studies, and Science. The four grade levels are: Primary, Intermediate, Junior High, and High School. The Objective-Item Bank provides school administrators with an initial starting point for curriculum development and with the instrumentation for program evaluation, and offers a mechanism to assist teachers in stating more specifically the goals of their instructional program. In addition, it provides the means to determine the extent to which the objectives are accomplished. This document presents the Objective Item Bank for high school mathematics. (CK)

HIGH SCHOOL MATHEMATICS
BEHAVIORAL OBJECTIVES AND TEST ITEMS

EVALUATION FOR INDIVIDUALIZED INSTRUCTION

A Title III ESEA project
administered by
Downers Grove, Illinois
School District 99

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individualized instruction • inservice workshops to improve skills in evaluating new programs • pupil progress

INSTITUTE FOR EDUCATIONAL RESEARCH

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1972 EDITION

	Lang. Arts	Math.	Soc. Stud.	Science
Primary				
Intermediate				
Junior High				
High School		X		

HIGH SCHOOL MATHEMATICS

BEHAVIORAL OBJECTIVES AND TEST ITEMS

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Evaluation for Individualized Instruction Project

AN ESEA TITLE III PROJECT

Administered

by

Downers Grove Public School District 99

1972 EDITION

BEHAVIORAL OBJECTIVE - TEST ITEM BANK

BACKGROUND

The Evaluation for Individualized Instruction Project, an ESEA Title III project administered by the Downers Grove, Illinois, School District 99, has developed an Objective-Item Bank covering sixteen sectors of four subject areas in each of four grade levels.

	Subject Area			
	LA	MA	SS	SC
1	11	12	13	14
2	21	22	23	24
3	31	32	33	34
4	41	42	43	44

LA = Language Arts
MA = Math
SS = Social Studies
SC = Science

1 = Primary
2 = Intermediate
3 = Junior High
4 = High School

Nearly 5000 behavioral objectives and over 27,000 test items based on these objectives were recently published as the culmination of this three-year project. The complete output of seventeen volumes totals over 4500 pages. These publications have been reproduced by the Institute for Educational Research to make them available at cost to teachers and administrators.

The objectives and items were written by over 300 elementary and secondary teachers, representing forty Chicago suburban school districts, who participated in workshops of three to nine weeks duration throughout the project. In these workshops they learned to write effective behavioral objectives and test items based on the objectives. The results of their work were edited for content and measurement quality to compile the largest pool of objectives and test items ever assembled.

PRINCIPLES AND MERITS

Unfortunately, the Objective-Item Bank is often viewed mainly as a source of test items. Although this is an important function, its greatest potential impact lies not in the availability of a multitude of test items, but rather in the ability of these items to measure carefully selected educational goals.

The almost frenetic search for test items on the part of some educators has been spurred by the current emphasis on measurement. Some educators have become so enamored with measurement that they seem more interested in obtaining a numerical index than examining what they are really trying to measure. Further, it is not unusual for teachers to speak about a child obtaining a score of 95% on a particular test. Frequently, they encounter considerable difficulty in interpreting the real meaning of a score and are content to just accept its numeral value. A much more important question would seem to be: What are our goals of measurement? Unless we can answer this question precisely, the only real purpose that testing serves is to gather data concerning pupils to facilitate the marking of report cards. This is not to say that this function is not legitimate - it is rather to say that such a view of measurement is much too constricting. The goal of measurement should be to provide feedback both to the teacher and the child regarding the success or failure of the learning experiences in realizing specifically stated objectives.

One of the main strengths of the EII Objective and Item Bank is that all the items are directly tied to specifically stated objectives. Each group of items is designed to measure a specific objective and therefore provides the means whereby the teacher can obtain feedback on the success of the educational program.

It is disheartening to observe so many districts attacking the complex problem of curriculum development independently. One cannot help reflecting on the mammoth duplication of efforts involved. The Objective-Item Bank offers a possible alternative to this duplication. Utilizing its resources, the curriculum committee is provided with some point of departure. The efforts of three hundred teachers participating in the Evaluation Project's workshops and the thoughts of forty districts can be evaluated and utilized. This is not to suggest that any set of objectives should be viewed as the "answer" to an individual district's curricular problem but rather the efforts of others offer a convenient point of departure and may serve to stimulate diverse opinions about the direction of curricular thrust within the individual district. The words of Sir Isaac Newton seem appropriate; "If I have seen further, it is by standing upon the shoulder of giants." The efforts of others, whether we consider them giant-like or pygmyish, do offer a threshold to view the immense, complicated problem of curricular development in better perspective.

The title of an article in a recent educational journal, "If You're Not Sure Where You're Going, You're Liable to End up Someplace Else," succinctly describes a continuing dilemma in our educational system. The vagueness of our goals often promotes the idea that "anything goes." Without a guiding beacon many classrooms become activity-centered rather than goal-oriented. One educator recently compared the all-too-typical classroom with Henry Ford's observation concerning history. He defined history as, "One damned thing after another." Is this true of the succession of activities within our classrooms? Does the teacher really know the educational purpose of each activity? Perhaps, even more importantly, do the children know the purpose?

The Objective-Item Bank offers a mechanism to assist teachers in stating more specifically the goals of their instructional program and further provides the means to determine the extent to which the objectives are accomplished. The specification of goals assists the teacher in discovering whether favored activities advance learning, or are merely time fillers; whether they get the "materials" across, or are merely perfunctory exercises.

Much discussion has been devoted to the topic of "why individualized instruction?" and occasionally some dialogue has even centered on the "how." But an even more basic question is one that is often ignored: "Individualize what?"

Many school districts mention their individualized programs in reading or mathematics. What is individualized within these programs? Are certain skills definitely identified? Is the practice of pretesting to determine the child's level of proficiency when he enters the program a guideline?

The Objective-Item Bank has two potential contributions to make to all school districts embarking on or presently engaged in individualized instruction programs. These contributions are: 1. A group of well-specified objectives which could form the "what" of the program. 2. A set of items designed to provide information on the degree of mastery of the objective.

APPLICATIONS AND TECHNIQUES

The versatility of the Objective-Item Bank is evident in the value and usability by both teachers and administrators.

To the Administration the Objective-Item Bank:

1. Provides an initial starting point for curriculum development. The existence of many objectives avoids the necessity of each district duplicating the efforts of another. The task of the curriculum committee becomes one of selecting and/or rejecting objectives from the Objective - Item Bank and then supplementing them with objectives developed at the local level. Past-participants of the Evaluation Project workshops would be valuable resource people in this endeavor.

2. Provides the instrumentation for program evaluation. The selection of items from those objectives representative of the main emphases of the local district provides the framework for the evaluation of the stated goals.

To the Teacher the Objective-Item Bank:

1. Provides the pooling of talent and imagination of teachers of varied experience and interests, thus avoiding the present duplication of effort.

2. Provides resources for more highly sensitized program evaluation instead of a battery of standardized tests. Since the objectives are tailored to the program, the associated test items can be used to determine precisely the efficacy of the instructional materials.

3. Provides the means whereby the teacher can become more acutely aware of that which he is seeking to have occur in his classroom and that which he will accept as evidence of its occurrence. Hopefully, as teachers become more aware of their goals, they will share these

objectives with children and let the pupils become acutely aware of that which is expected of them, ergo allowing them to seek their own modality of instruction for the realization of the stated goals.

4. Provides the nucleus of an individualized instruction program.

    a. It provides for more precise curriculum planning by differentiating those goals specific to each grade and even to each student. With the bank at their disposal, teachers are encouraged to become aware of their responsibilities in developing a set of basic objectives which every child must attain and a further set which can be pursued according to the students' abilities and interests.

    b. It provides several items per objective, some of which may be used as a pre-test to discover whether a student should undertake that objective while the remainder may be employed to measure the mastery of those students who do tackle the objective.

NOTES

Several of the volumes have been reproduced from punched cards by the IBM 407, a machine which does not print all characters exactly as they appear on a typewriter. Thus:

% is actually (

¤ is actually)

0 is actually ? or !

Apostrophes cannot be printed.

The number immediately after the statement of each objective represents the number of items measuring attainment of that objective.

Information on the EII publications or purchase requests can be directed to:

INSTITUTE FOR EDUCATIONAL RESEARCH
1400 West Maple Avenue
Downers Grove, Illinois 60515

HIGH SCHOOL MATHEMATICS

ANGLES

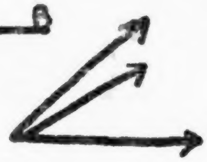
THE STUDENT WILL IDENTIFY VARIOUS TYPES OF ANGLES BY MATCHING THE NAME OF THE ANGLE WITH A DIAGRAM. (7) 0178

Directions: Match column A with column B.

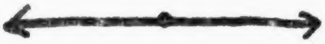
A		
e	vertical angle	4200582
b	straight angle	4200583
a	adjacent angles	4200584
c	obtuse angle	4200585
d	complementary angles	4200586
f	acute angle	4200587
g	right angle	4200588

B

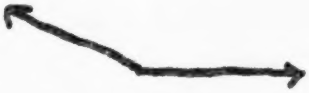
a.



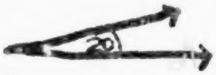
b.

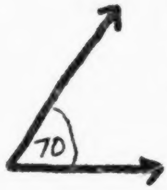


c.

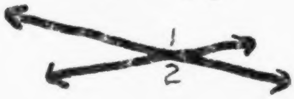


d.

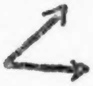




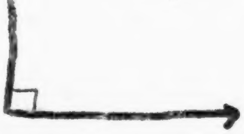
e.



f.



g.



THE STUDENT CAN DEMONSTRATE HIS ABILITY TO RECALL THE DEFINITIONS OF DIFFERENT TYPES OF ANGLES BY CHOOSING AN INCORRECT STATEMENT FROM A LIST OF STATEMENTS. (2) 0651

1. Which of the following statements are false? 2505

a. A right angle is an angle with measure of 90°.
b. An obtuse angle is an angle with a measure greater than 90°.
c. Equal angles have the same measure.
d. A midray is the ray that bisects the angle.
*e. None of the above.

2. Which of the following statements are false? 2506

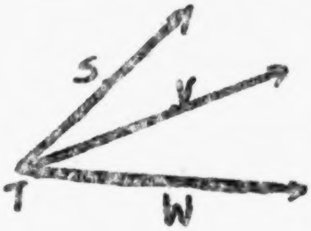
a. A midray divides an angle into two congruent angles.
*b. An acute angle is an angle with measure less than or equal to 90°.
c. An angle that has a measure of 130° can be bisected.
d. There are no angles whose measure are 0° or 180°.
e. None of the above.

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO RECALL NOTATIONS OF ANGLES, GIVEN A DIAGRAM OF SOME ANGLES, BY CHOOSING AN INCORRECT NOTATION FROM A LIST. (1) 0648

Items:

1. Which of the following is not an angle in the adjacent figure? 2500

a. VTS
b. WTS
*c. SVW
d. WTV
e. STV

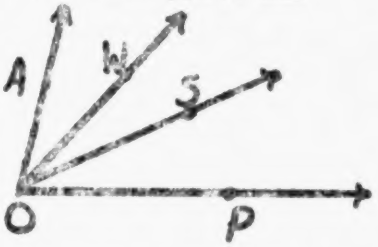


THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF COMMON SIDES OF ANGLES BY PREDICTING THE SIDE THAT TWO ANGLES HAVE IN COMMON. (3) 0649

Items:

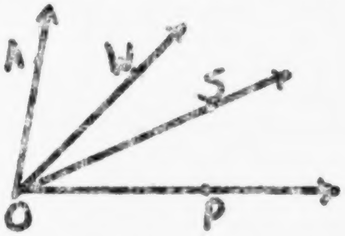
1. In the adjacent figure, state the side that $\angle$ POW and $\angle$ AOS have in common. 2501

a. $\overrightarrow{OA}$
b. $\overrightarrow{OW}$
c. $\overrightarrow{OS}$
d. $\overrightarrow{OP}$
*e. the null set



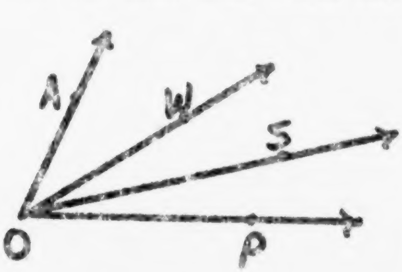
2. In the adjacent figure state the side that $\angle$ AOS and $\angle$ WOS have in common. 2502

a. $\overrightarrow{OA}$
b. $\overrightarrow{OW}$
*c. $\overrightarrow{OS}$
d. $\overrightarrow{OP}$
e. the null set



3. In the adjacent figure state the side that $\angle$ AOW and $\angle$ WOP have in common. 2503

a. $\overrightarrow{OA}$
*b. $\overrightarrow{OW}$
c. $\overrightarrow{OS}$
d. $\overrightarrow{OP}$
e. the null set



THE STUDENT DEMONSTRATES HIS ABILITY TO USE THE CONCEPT OF REFERENCE ANGLE BY CHOOSING THE CORRECT REFERENCE ANGLE FOR A GIVEN ANGLE. (5) 0136

The reference angle for 120° is: 4200368

a. -60°
b. 30°
*c. 60°
d. -30°

Express cos 160° as a function of a positive acute angle. 4200369

*a. $-\cos 20^\circ$
b. $-\tan 20^\circ$
c. $\cos 20^\circ$
d. $\tan 20^\circ$

Find the cos 165° to four significant figures. 4200370

a. 0.9659
*b. - 0.9659
c. 0.2588
d. - 0.2588

Determine the measure of θ to the nearest ten minutes if θ is a positive angle terminating in the 3rd quadrant and measuring less than one rotation. 4200371

$\cot \theta = 0 . 1853$ III

a. $10^\circ 30'$
*b. $259^\circ 30'$
c. $243^\circ 20'$
d. $16^\circ 40'$

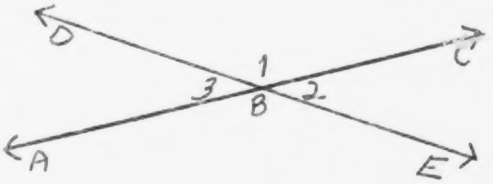
Determine, correct to lengths, the rectangular coordinates of the point p for which op has length 5, and whose positive angle is 125°. 4200372

a. $(4.1, 2.9) = (a,b)$
b. $(-4.1, 2.9) = (a,b)$
*c. $(-2.9, 4.1) = (a,b)$
d. $(-2.9, -4.1) = (a,b)$

THE STUDENT CAN APPLY THE RELATIONSHIP BETWEEN INTERIOR AND EXTERIOR ANGLES IN A TRIANGLE BY CHOOSING A STATEMENT WHICH CANNOT BE PROVED. (1) 0204

In the adjacent drawing, (A,B,C are collinear), which of the following cannot be proved? 4200756

*a. 1 and 2 are congruent.
b. 1 and 2 are supplementary.
c. 1 and 3 are supplementary.
d. 2 and 3 are congruent.



THE STUDENT CAN SHOW HIS ABILITY TO APPLY THE EXTERIOR ANGLE THEOREM BY IDENTIFYING THE LOGICAL CONCLUSION GIVEN A SET OF DATA. (2) 0577

Items:

1. If in triangle ABC, angle A is a right angle and angle X is an exterior angle at vertex B for triangle ABC then angle X is a(n)______. 2068

a. acute angle
b. right angle
*c. obtuse angle
d. insufficient information

2. In a triangle ABC, angle A is 40 degrees and angle B is 72 degrees. What can be said of angle Y which is an exterior angle of triangle ABC at vertex C. That angle Y is _____. 2069

a. greater than 40 degrees
*b. greater than 72 degrees
c. less than 40 degrees
d. less than 72 degrees
e. equal to 72 degrees

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF AN EXTERIOR ANGLE BY DETERMINING WHAT RELATIONSHIPS THE EXTERIOR ANGLE HAS WITH AN INTERIOR ANGLE. (2) 0663

Items:

1. Which of the following relationships does an exterior angle have with the nearest interior angle? They form 2547

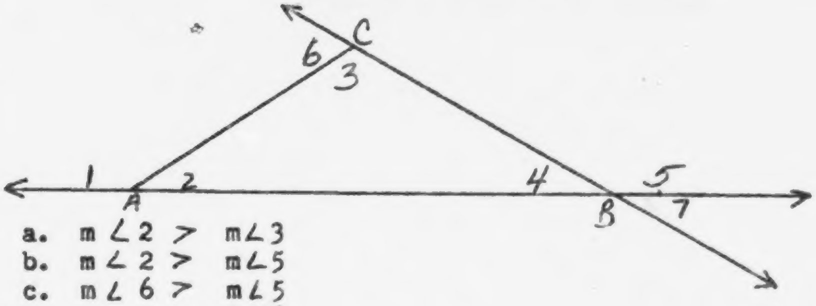
a. vertical angles
b. complementary pairs
*c. a linear pair
d. perpendicular lines
e. none of the above

2. An exterior angle of a triangle is 2548

*a. greater than each remote interior angle
b. less than each remote interior angle
c. congruent to at least one of the remote interior angles
d. none of the above hold true in all triangles

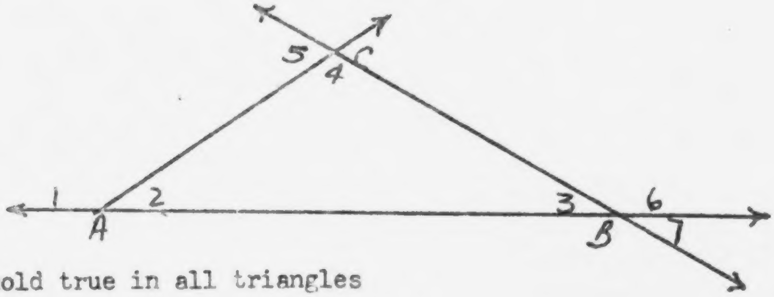
THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS COMPREHENSION OF EXTERIOR ANGLES BY FINDING THE RELATIONSHIPS BETWEEN ANGLES. (5) 0664

1. If the measure of angle 3 is greater than the measure of angle 4, which of the following must be true? 2549



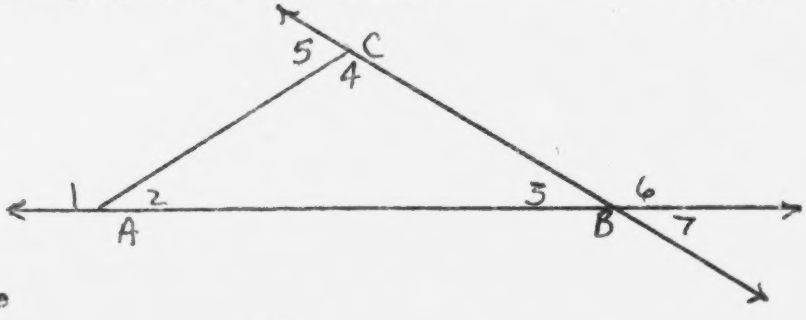
a. $m\angle 2 > m\angle 3$
b. $m\angle 2 > m\angle 5$
c. $m\angle 6 > m\angle 5$
*d. $m\angle 5 > m\angle 6$
e. none of the above

2. If the measure of angle 2 is less than the measure of angle 3, which of the following must be true? 2550



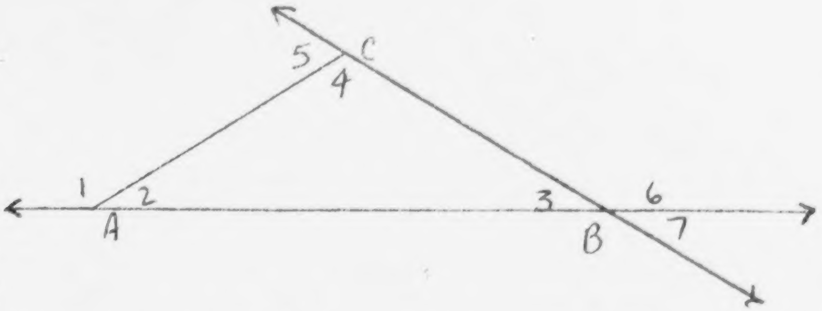
a. $m\angle 1 > m\angle 5$
b. $m\angle 5 > m\angle 1$
c. $m\angle 3 < m\angle 6$
d. $m\angle 2 = m\angle 7$
*e. none of the above hold true in all triangles

3. Which of the following statements must be true? 2551



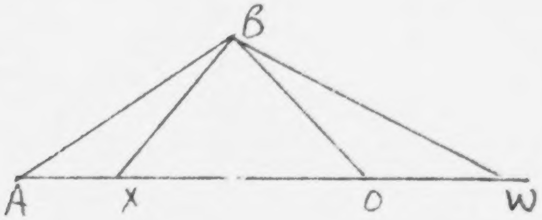
a. $m\angle 5 > m\angle 4$
b. $m\angle 5 > m\angle 1$
c. $m\angle 5 > m\angle 6$
*d. $m\angle 5 > m\angle 7$
e. none of the above

4. If the measure of angle 5 is greater than the measure of angle 6, which of the following must be true? 2552



a. m∠5 > m∠1
b. m∠7 > m∠3
c. m∠7 > m∠2
*d. m∠5 > m∠4
e. not enough information given to justify a conclusion

5. If BX = BW, then which of the following statements are true? 2553



a. m∠ABO > m∠W
b. m∠BOW > m∠BXA
c. m∠OBW > m∠W
*d. m∠W > m∠A
e. none of the above

THE STUDENTS CAN ANALYZE THE RELATIONSHIP BETWEEN ANGLES AND THEIR INTERCEPTED ARC OR ARCS BY CHOOSING THE CORRECT DESCRIPTION OF TWO GIVEN ANGLES RELATIONSHIP. (1) 0194

The opposite angles of a quadrilateral inscribed in a circle are: 4200697

a. congruent
b. complementary
*c. supplementary
d. none of the above

THE STUDENT CAN APPLY THE THEORIES OF PARALLELISM BY DETERMINING THE SIZE OR RELATIONSHIP OF ANGLES. (3) 0196

Two consecutive angles of a parallelogram are (x + 30) and (2x-60). One of the angles of the parallelogram is 4200703

a. 50 degrees
b. 60 degrees
c. 70 degrees
*d. 80 degrees
e. none of the above

Two opposite angles of a parallelogram are (x+30) and (3x-50). One of the angles of the parallelogram is 4200704

a. 40 degrees
b. 50 degrees
c. 60 degrees
*d. 70 degrees
e. none of the above

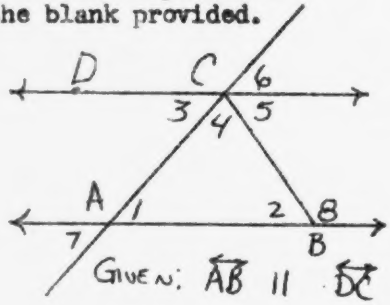
The acute angles of an isosceles right triangle are 4200705

a. complementary
b. supplementary
c. congruent
*d. a and c
e. b and c

THE STUDENT CAN DETERMINE THE MEASURE OF AN ANGLE BY APPLYING THE THEOREMS OF PARALLELISM. (10) 0197

Directions: Matching: Write the letter that represents the correct answer in the blank provided.

Choices:
a. 30°
b. 35°
c. 43°
d. 50°
e. 87°
f. 130°
g. none of the above



GIVEN: $\overleftrightarrow{AB} \parallel \overleftrightarrow{DC}$

If $\angle 3 = 43^\circ$, then $\angle 1 =$ c 4200706

If $\angle 6 = 30^\circ$, then $\angle 1 =$ a 4200707

If $\angle 8 = 123^\circ$ and $\angle 4 = 80^\circ$ then $\angle 1 =$ c 4200708

If $\angle 5 = 50^\circ$, then $\angle 8 =$ f 4200709

If $\angle 1 = 43^\circ$, $\angle 8 = 130^\circ$, then $\angle 4 =$ e 4200710

If $\angle 6 = 35^\circ$, AC = CB, then $\angle 2 =$ b 4200711

If $\angle 6 = 47^\circ$, $\angle 2 = 90^\circ$, then $\angle 4 =$ c 4200712

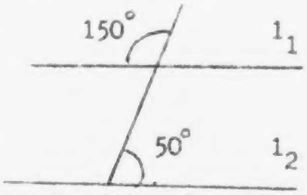
If $\angle 3 = 50^\circ$, and $\angle 4 = 43^\circ$, then $\angle 5 =$ e 4200713

If $\angle 6 = 50^\circ$, $\angle 7 =$ d 4200714

If $\angle 8 = 90^\circ$, $\angle 4 = 65^\circ$, then $\angle 6 =$ g 4200715

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF PROPERTIES OF PARALLELISM AND PERPENDICULARITY BY SELECTING AND RELATING THESE PROPERTIES WITH GIVEN SETS OF CONDITIONS. (12) 0509

1. Which of the following is true, with reference to the figure? 1886



a. $l_1 \parallel l_2$

*b. l_1 is not parallel to l_2

c. $l_1 \cap l_2 = \emptyset$

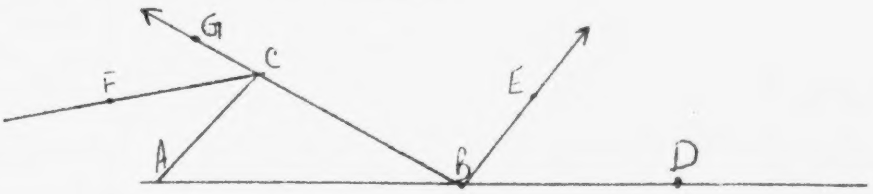
d. insufficient information is given to determine if any of the above is true.

2. What kind of geometric figure is the set of all points each of which is equidistant from the endpoints of a segment? 1887

a. 1 point
b. 1 or 2 points
c. segment
d. ray
*e. line

3. If l_1, l_2 and l_3 are distinct lines such that $l_1 \cap l_2 = \emptyset$ and $l_1 \cap l_3 \neq \emptyset$, how many points are contained in the set $(l_1 \cup l_2) \cap l_3$? 1888

a. 0
b. 1
*c. 2
d. infinitely many
e. information given is insufficient to determine any of the first four choices.



Given: $\overrightarrow{BE}$ bisects $\angle DBC$, $\overrightarrow{CF}$ bisects $\angle GCA$

$BE \parallel AC$, and $m \angle ABC = 40$

Directions: Use the figure and information given above for items 4-7.

4. Find m $\angle$ DBE. 1889

a. 50°
b. 60°
*c. 70°
d. 80°
e. none of these

5. Find m $\angle$ GCF. 1890

a. 50°
b. 60°
c. 70°
d. 80°
*e. none of these

6. Find m $\angle$ FAB, if $\overleftrightarrow{FA}$ $\overleftrightarrow{BC}$. 1891

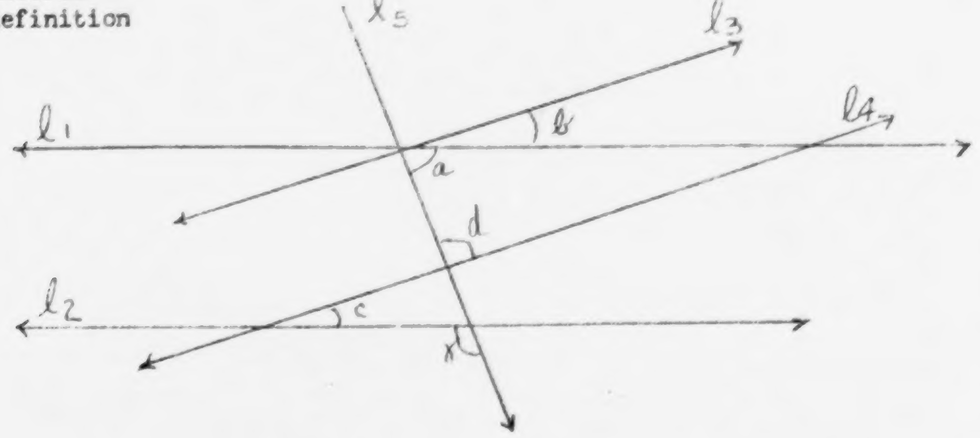
a. 50°
b. 60°
*c. 70°
d. 80°
e. none of these.

7. To prove, indirectly, that $\overleftrightarrow{FC}$ intersects $\overleftrightarrow{BE}$, suppose $\overleftrightarrow{FC} \cap \overleftrightarrow{BE} = \emptyset$. Which of the following statements is most immediately contradicted by this supposition? 1892

a. If two distinct lines are intersected by a transversal making a pair of alternate interior angles congruent, the lines are parallel.
b. If a line is parallel to one of two distinct lines, it is parallel to the other.
c. a transversal to two distinct parallel lines intersects their union in exactly two points.
*d. through a given external point there is exactly one line parallel to a given line.
e. two lines are parallel if and only if their intersection is not a set containing a single point.

8. The statement "There is one and only one line is a: 1893

- *a. postulate
- b. theorem
- c. definition



Given: $x=120$, $l_1 \parallel l_2$, $l_3 \parallel l_4$ and $l_3 \perp l_5$

Directions: Use the above figure and information for items 9-12.

9. Find a. 1894

- a. 50°
- *b. 60°
- c. 70°
- d. 80°
- e. 90°

10. Find b. 1895

- a. 10°
- b. 20°
- *c. 30°
- d. 40°
- e. 50°

11. Find c. 1896

- a. 10°
- b. 20°
- *c. 30°
- d. 40°
- e. 50°

12. Find d. 1897

- a. 50°
- b. 60°
- c. 70°
- d. 80°
- *e. 90°

THE STUDENT WILL SHOW HIS COMPREHENSION OF TYPES OF ANGLES BY IDENTIFYING THE TYPE OF ANGLE FORMED IN A GIVEN SITUATION. (2) 0568

1. Given $\angle ABC$, such that $\angle ABC$ is an obtuse angle, and midray $\overrightarrow{BD}$, which one of the following statements is true about $\angle ABD$? 2041

a. is obtuse angle
*b. is an acute angle
c. is a right angle
d. is sometimes an acute angle and sometimes a right angle
e. is sometimes an acute, sometimes an obtuse, and sometimes a right angle

2. If angle ABC and angle DEF form a linear pair with $\overrightarrow{BH}$ a midray of $\angle ABC$ and $\overline{EG}$ a midray of $\angle DEF$ which of the following is a valid conclusion? 2042

a. $\angle ABC \cong \angle DEF$
b. $\angle GAH$ is an acute angle
c. $\angle GEH$ is an obtuse angle
*d. $EG \perp \overline{AH}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE THE RELATIONSHIP BETWEEN THE ANGLES FORMED BY TWO PARALLEL LINES AND A TRANSVERSAL BY CHOOSING THE CORRECT DESCRIPTION FOR A GIVEN SITUATION. (5) 0203

The bisectors of the interior angles on the same side of a transversal to two parallel lines are 4200751

a. parallel
*b. perpendicular
c. intersecting but not perpendicular
d. skew

The bisectors of alternate interior angles formed by a transversal to two parallel lines are 420075

*a. parallel
b. perpendicular
c. intersecting but not perpendicular
d. skew

The bisectors of opposite angles of a rectangle are 420075

*a. parallel
b. perpendicular
c. intersecting but not perpendicular
d. skew

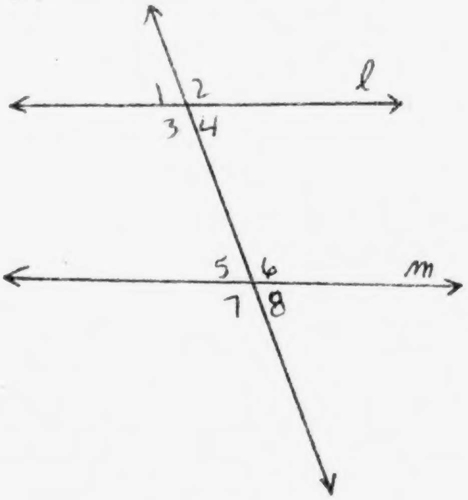
The corresponding angles formed by two parallel lines by one transversal are 4200754

a. complementary
b. supplementary
*c. congruent
d. a and c
e. b and c

If a transversal is perpendicular to each of two parallel lines, then the alternate interior angles formed by these are 4200755

a. complementary
b. supplementary
c. congruent
d. a and c
*e. b and c

THE STUDENT CAN DEMONSTRATE HIS COMPREHENSION OF THE ANGLES FORMED BY A TRANSVERSAL AND PARALLEL LINES BY DETERMINING THE RELATIONSHIPS BETWEEN THE ANGLES. (4) 0674



1. If lines l and m are parallel, then angles 3 and 6 2578

*a. are congruent because they are alternate interior angles.
b. are congruent because they are corresponding angles
c. are supplementary because they form a linear pair
d. are supplementary
e. None of the above

2. If lines l and m are parallel, then angles 2 and 8 are 2579

a. congruent because they are alternate interior angles
b. Congruent because they are corresponding angles
c. Congruent because they are vertical angles
d. Supplementary because they form a linear pair
*e. None of the above

3. If lines l and m are parallel then angles 3 and 7 are 2580

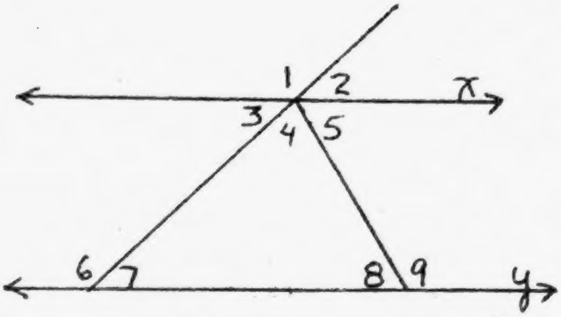
 a. congruent because they are alternate interior angles
*b. congruent because they are corresponding angles
 c. congruent because they are vertical angles
 d. supplementary because they form a linear pair
 e. None of the above

4. If lines l and m are parallel then angles 4 and 6 are 2581

 a. congruent because they are corresponding angles
 b. congruent because they are alternate interior angles
 c. supplementary because they form a linear pair
*d. supplementary
 e. None of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THE THEOREMS ABOUT ANGLES FORMED BY PARALLEL LINES AND TRANSVERSALS OR TRIANGLES BY COMPUTING THE MEASURES OF THE ANGLES. (5) 0675

1. If the lines x and y are parallel, and the measures of angles 6 and 4 are 145° and 88° respectively, then the measure of angle 8 is 2582



 a. 35°
*b. 57°
 c. 88°
 d. 92°
 e. None of the above

2. If lines x and y are parallel, and the measures of angles 1 and 8 are 130° and 62° respectively, then the measure of angle 4 is 2583

- a. 50°
- b. 62°
- *c. 68°
- d. 77°
- e. None of the above.

3. If lines x and y are parallel and the measures of 2 and 8 are 41° and 47° respectively then the measure of angle 7 is: 2584

- *a. 41°
- b. 47°
- c. 88°
- d. 133°
- e. None of the above.

4. If lines x and y are parallel and the measure of angle 5 is 40°, then the measure of angle 9 is 2585

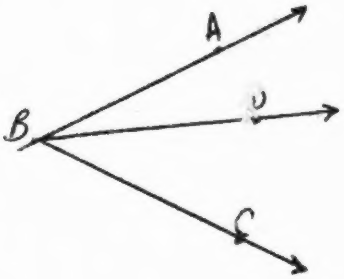
- a. 40°
- b. 50°
- *c. 140°
- d. 150°
- e. None of the above.

5. If the measure of the first angle of a triangle is twice the measure of the second angle, and the measure of the third angle is 5 more than the first, what is the measure of the second angle? 2586

- *a. 35°
- b. 40°
- c. 43 3/4 °
- d. 87½°
- e. None of the above.

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF ANGLE PROPERTIES SUCH AS COMPLEMENTARY, SUPPLEMENTARY, EQUIVALENCE RELATION, ADDITION, LINEAR PAIRS, AND MEASURES BY SELECTING FROM A LIST OF PROPERTIES THOSE WHICH SATISFY A GIVEN SET OF CONDITIONS. (15) 0505

1. In the figure, if ABC is a right angle, then 1855



a. ∠ABD and ∠DBC form a linear pair.
b. ∠ABD and ∠DBC are supplementary.
*c. ∠ABD and ∠DBC are complementary.
d. ∠ABC is bisected by $\overrightarrow{BD}$.
e. $\overrightarrow{BD}$ is a subset of the interior of ∠ABC.

2. Consider the relations, on the set of angles, I) "is the complement of,", II)""is congruent to", III) " has the same measure as". Which of these are equivalence relations? 1856

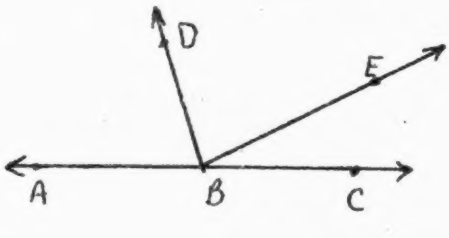
a. none of I, II, or III
b. all of I, II, and III
c. I and II only
d. I and III only
*e. II and III only

3. If $\overrightarrow{BA}$, $\overrightarrow{BC}$, and $\overrightarrow{BD}$ are distinct rays, with $\overrightarrow{BA}$ and $\overrightarrow{BC}$ as opposite rays, then it is necessary that: 1857

a. $\overrightarrow{BR} \perp \overrightarrow{BC}$
*b. ∠ABR is supplementary to ∠RBC
c. ∠ABR is complementary to ∠RBC
d. R, B, and C are collinear
e. R is between A and C

4. If A-B-C and m ∠DBE = 75°, then m ∠ABD + m ∠CBE is 1858

a. 95°
b. 100°
*c. 105°
d. 110°
e. 115°



5. If two angles are supplementary and have the same measure, what is their common measure? 1859

a. 45°
b. 60°
*c. 90°
d. 120°
e 180°

6. Let points M, K, and A be in the edge of a half-plane, with M-A-K. Also, let T and A be points in the same half-plane such that $m\angle TAK = 47^\circ$, $m\angle MAV = 81^\circ$ What is $m\angle TAV$? 1860

a. 38°
*b. 52°
c. 56°
d. 128°
e. none of these.

On scratch paper, sketch the figure described below, then answer items 7 and 8: 1861

$\overrightarrow{AB}$ and $\overrightarrow{AC}$ are opposite rays. Points E, F, and H are on the same side of $\overleftrightarrow{AB}$. $\overleftrightarrow{BF} \perp \overleftrightarrow{AC}$. Points A and H are on the same side of $\overrightarrow{BF}$. Point F is in the interior of $\angle HBE$, and $m\angle CBH = m\angle HBF = m\angle FBE$.

7. What is the measure of $\angle ABH$, as described above? 1862

a. 30°
*b. 45°
c. 60°
d. 135°
e. none of the above

8. For $\angle HBE$, as described above, which of the following conclusions is true? 1863

a. $\angle HBE$ and $\angle ABH$ form a linear pair
b. $m\angle HBE = 3\, m\angle ABH$
c. $\angle HBE$ is an acute angle
*d. $\angle HBE$ is a right angle
e. $\angle HBE$ is an obtuse angle

9. First, find $m\angle A$ if the measure of its complement is four times $m\angle A$. Then, determine which of the following is true. 1864

*a. $15^\circ < m\angle A \leq 20^\circ$
b. $20^\circ < m\angle A \leq 25^\circ$
c. $25^\circ < m\angle A \leq 30^\circ$
d. $30^\circ < m\angle A \leq 35^\circ$
e. none of these

10. First, find m $\angle A$ if the measure of its supplement is 70° more than 2 times the measure of its complement. Then, which of the following is true? 1865

a. $40^\circ < m\angle A \le 50^\circ$
b. $50^\circ < m\angle A \le 60^\circ$
*c. $60^\circ < m\angle A \le 70^\circ$
d. $70^\circ < m\angle A \le 80^\circ$
e. $80^\circ < m\angle A < 90^\circ$

For 11-14:

Two half-planes H_1 and H_2 are determined by line $\overleftrightarrow{AB}$. P is a point of H_1 such that $m\angle PAB = 60$. Q is a point of H_2 such that $\angle QAB$ is complementary to $\angle PAB$. R and S are points such that $\overrightarrow{AR}$ and $\overrightarrow{AP}$ are opposite rays, and S-A-B.

11. m $\angle QAB$, as described above, is: 1866

*a. 30°
b. 45°
c. 60°
d. 90°
e. 120°

12. m $\angle BAR$, as described above, is: 1867

a. 30°
b. 45°
c. 60°
d. 90°
*e. 120°

13. $\angle QAR$, as described above, is: 1868

a. an acute angle
*b. a right angle
c. an obtuse angle

14. $\angle QAB$ and $\angle RAS$, as described above: 1869

a. have the same measure
b. form a linear pair
*c. are complementary angles
d. are each complementary to $\angle PAB$
e. are each supplementary to $\angle PAS$

15. If m $\angle$BAD = 47° and m $\angle$DAC = 62°, which of the following conclusions must be true, regarding m $\angle$CAB? 1870

a. m $\angle$CAB = 15°
b. m $\angle$CAB = 77°
c. m $\angle$CAB = 109°
*d. m $\angle$CAB = 15° or m $\angle$CAB = 109°
e. m $\angle$CAB = 77° or m $\angle$CAB = 109°

THE STUDENT CAN SHOW HIS UNDERSTANDING OF COMPLEMENTARY AND SUPPLEMENTARY ANGLES BY CALCULATING THE MEASURE OF AN ANGLE GIVEN INFORMATION ABOUT ITS SUPPLEMENT OR COMPLEMENT. (5) 0569

1. The measure of the supplement of an angle is five times the measure of the angle; then the measure of the angle is ________. 2043

a. 175°
b. 85°
c. 15°
*d. 30°
e. none of the above.

2. The measure of an angle is 25° more than the measure of its complement; then the measure of the angle is __________. 2044

*a. $57\frac{1}{2}^\circ$
b. 155°
c. 65°
d. $3\frac{6}{13}^\circ$
e. none of the above

3. If the supplement of an angle is equal to three times its complement, then the measure of the angle is __________. 2045

a. 30°
b. $22\frac{1}{2}^\circ$
*c. 45°
d. 60°
e. none of the above

4. The measure of the supplement of an angle is 30 less than twice the measure of the angle. The measure of the angle is ________. 2046

*a. 70°
b. 30°
c. 60°
d. 150°
e. 75°
f. none of the above.

5. If the measure of $\angle$ PQR is 52, then the supplement of $\angle$ PQR is 2047

a. 52°
b. 38°
c. 28°
*d. 128°
e. 138°

THE STUDENT CAN DEMONSTRATE HIS KNOWLEDGE OF COMPLEMENTARY AND SUPPLEMENTARY ANGLES BY COMPUTING THE ANGLE MEASURES OR SELECTING THE PROPER RELATIONSHIPS BETWEEN ANGLES. (7) 0653

1. If one angle is acute, then its supplement is 2509

a. acute
b. right
*c. obtuse
d. congruent
e. this problem is impossible

2. If one angle is obtuse, then its complement is 2510

a. acute
b. right
c. obtuse
d. congruent
*e. this problem is impossible

3. If the measure of angle A is twice the measure of angle B, and A is supplementary to B, then the measure of A is 2511

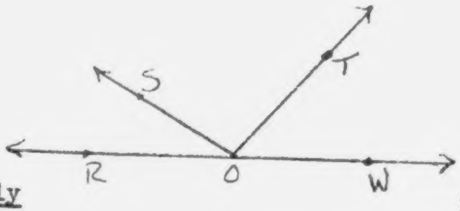
a. 30°
b. 60°
c. 90°
*d. 120°
e. not enough information given to solve the problem.

4. If the measure of angle A is 10° more than the measure of angle B, and angle A and angle B are supplementary, then the measure of angle B is 2512

a. 40°
b. 50°
*c. 85°
d. 95°
e. none of the above

5. If the measure of angle A is 11 times the measure of angle B, and angles A and B are supplementary, the measure of the compliment of angle B is 2513

a. 15°
b. 35°
*c. 75°
d. 175°
e. the problem is impossible.

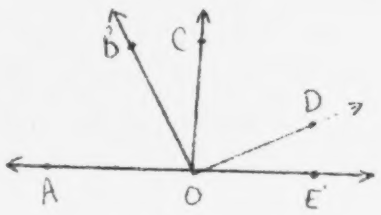


6. If OS $\perp$ OT, then they are exactly 2514

a. one right angle, one set of complementary angles, and one set of supplementary angles
*b. one right angle, one set of complements, and two sets of supplements
c. one right angle, no complementary angle, two sets of supplementary angles
d. one right angle, no complementary angle, and one set of supplementary angles
e. none of the above

7. If OC $\perp$ AE and BO $\perp$ OD, then there are exactly 2515

a. 2 different sets of complements
b. 3 different sets of complements
*c. 4 different sets of complements
d. 5 different sets of complements
e. 6 different sets of complements



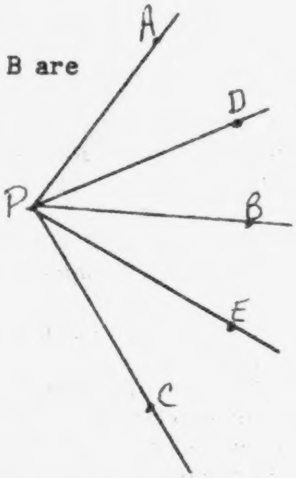
THE STUDENT WILL SHOW HIS UNDERSTANDING OF THE DEFINITION OF INTERIOR AND EXTERIOR OF AN ANGLE BY RECALLING THE DEFINITION AND CLASSIFYING POINTS AS BEING EITHER THE INTERIOR OR THE EXTERIOR OF AN ANGLE. (2) 0566

1. Given $\angle ABC$, the interior of $\angle ABC$ is ______. 2037

a. The union of the half-plane formed by $\overrightarrow{AB}$ containing C and the half-plane $\overleftrightarrow{BC}$ containing A.
b. The intersection of the half-plane formed by $\overleftrightarrow{AB}$ containing C and the half-plane $\overleftrightarrow{AC}$ containing B.
c. The union of the half-plane formed by $\overleftrightarrow{AB}$ containing C and the half-plane $\overleftrightarrow{AC}$ containing B.
*d. The intersection of the half-plane formed by $\overleftrightarrow{AB}$ containing C and the half-plane $\overleftrightarrow{BC}$ containing A.

2. Given the following figure points E and B are in the interior of __________. 2038

a. $\angle APE$ and $\angle DPC$
b. $\angle DPE$ and $\angle DPC$
c. $\angle DPE$ and $\angle BPC$
*d. $\angle APC$ and $\angle DPC$



THE STUDENT CAN SHOW HIS UNDERSTANDING OF THE DEFINITION OF CONVEX SET IN RELATION TO THE INTERIOR AND EXTERIOR OF AN ANGLE BY CLASSIFYING THE INTERIOR AND EXTERIOR AS TO THEIR BEING CONVEX SETS OR NOT. (2) 0567

1. Given angle ABC, which one of the following statements is true? 2039

a. The interior and exterior of $\angle ABC$ are both convex sets.
*b. The interior of ABC is convex and the exterior of $\angle ABC$ is not convex.
c. The interior and exterior of $\angle ABC$ are NOT convex.
d. The interior of $\angle ABC$ is NOT convex but the exterior of $\angle ABC$ is convex.

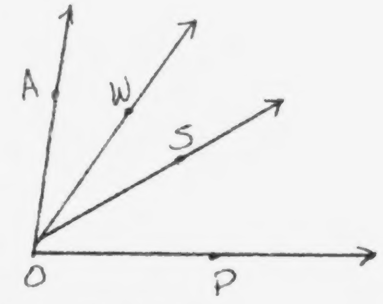
2. Given angle ABC and a point P such that A-P-B then which of the following statements is true? 2040

a. P is in the exterior of $\angle ABC$
b. P is in the interior of $\angle ABC$
c. P is in the half-plane determined by $\overleftrightarrow{AB}$ and point C.
*d. none of the above.

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE EXTERIOR AND INTERIORS OF ANGLES BY DETERMINING IF A POINT IS IN THE EXTERIOR OR INTERIOR OF A GIVEN ANGLE. (1) 0650

1. In the adjacent figure, which of the following statements are false? 2504

a. P is in the exterior of angle WOS
b. W is in the interior of angle AOP
c. S is not in the interior of angle SOP.
*d. A is not in the exterior of angle WOP
e. none of the above



THE STUDENT CAN SHOW HIS KNOWLEDGE OF THE DEVELOPMENT OF THE VERTICAL ANGLE THEOREM BY IDENTIFYING THE BASIC FACT USED IN ITS DEVELOPMENT. (1) 0575

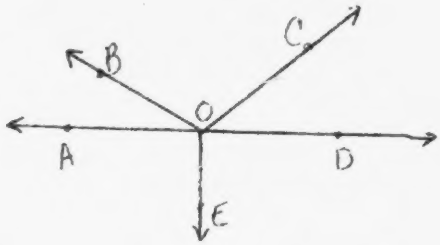
1. In the proof of the theorem "vertical angles are congruent" the basic approach used was ____________. 2061

a. Perpendicular form right angles and any two right angles are congruent.
*b. If two angles form a linear pair, then they are supplementary.
c. A correspondence between two triangles is a congruence if two sides and the included angle of one triangle are congruent to the corresponding parts of the other.
d. Corresponding parts of congruent trianglesare congruent.

THE STUDENT CAN DEMONSTRATE HIS KNOWLEDGE OF PERPENDICULAR LINES AND LINEAR PAIRS BY IDENTIFYING THE NUMBER OF LINEAR PAIRS, AND THE TYPE OF ANGLES FORMED IN A GIVEN DIAGRAM. (2) 0652

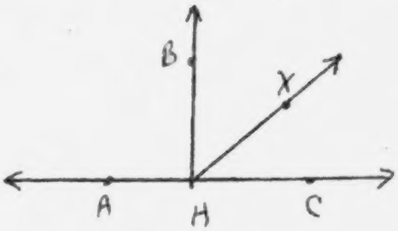
1. In the adjacent figure, how many different linear pairs are there? 2507

a. none
b. one
c. two
*d. three
e. four



2. If BH$\perp$AC, which of the following statements are false? 2508

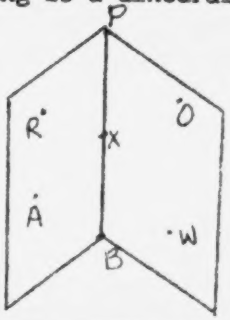
a. angle AHB is a right angle
b. angle AHX and angle XHC are linear pairs
c. angle XHC is an acute angle
d. angle AHX is an obtuse angle
*e. none of the above



THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF DIHEDRAL ANGLES BY NAMING THE DIHEDRAL ANGLE. (1) 0697

1. Which of the following is a dihedral angle in the adjacent figure? 2653

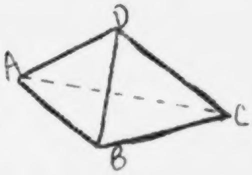
a. angle RXA
b. angle ABW
c. angle A-PX-B
d. angle O-PB-W
*e. angle R-XB-O



THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS UNDERSTANDING OF DIHEDRAL ANGLES BY COMPUTING THE MAXIMUM NUMBER OF DIHEDRAL ANGLES A SOLID FIGURE HAS. (2) 0696

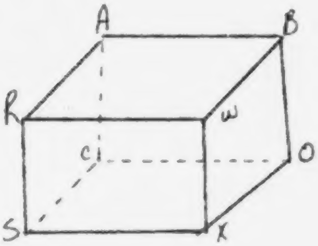
1. In the adjacent figure, how many different dihedral angles are there? 2654

a. 3
b. 4
*c. 6
d. 8
e. none of the above



2. In the figure how many dihedral angles are there? 2655

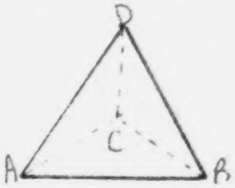
a. 4
b. 6
*c. 12
d. none of the above



THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY HIS KNOWLEDGE OF PLANE ANGLES AND DIHEDRAL ANGLES BY STATING EACH PLANE ANGLE OF A DIHEDRAL ANGLE AND COMPUTING ITS MEASURE. (5) 0699

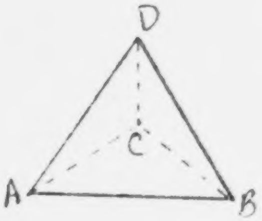
1. If $\overline{CB} \perp \overline{AC}$ and $\overline{DC} \perp \overline{CB}$, then 2656

a. angle ACB is a plane angle of A-DC-B
*b. angle ACD is a plane angle of A-CB-D
c. angle DCB is a plane angle of D-AC-B
d. angle DAC is a plane angle of D-AB-C



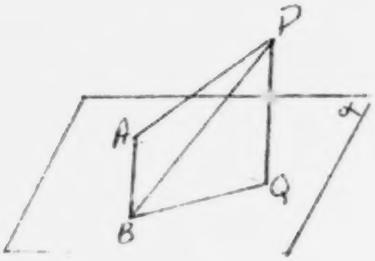
2. If $\overline{DC} \perp \overline{AC}$ and $\overline{CB} \perp \overline{DC}$, then 2657

*a. angle ACB is a plane angle of A-DC-B
b. angle ACD is a plane angle of A-CB-D
c. angle DCB is a plane angle of D-AC-B
d. angle DAC is a plane angle of angle D-AB-C



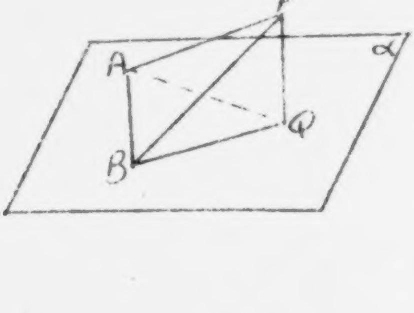
3. If $\overline{PQ} \perp \alpha$, $\overline{AQ} \cong \overline{BQ}$, m ∠ QAB is 55°, then m∠A - PQ - B is 2658

a. 35°
b. 55°
*c. 70°
d. 90°
e. none of the above

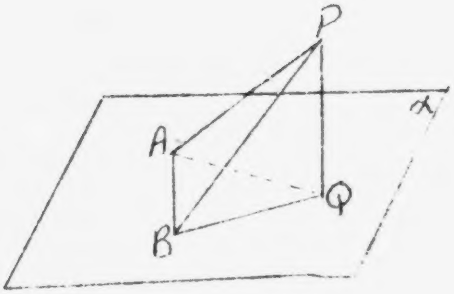


4. If $\overline{PQ} \perp \alpha$, $\overline{AQ} \cong \overline{BQ}$ and m∠A-PQ-B is 40° then m ∠ QBA is 2659

a. 40°
b. 50°
*c. 70°
d. 90°
e. none of the above



5. If $\overline{PQ} \perp \overline{AQ}$, $\overline{BQ} \perp \overline{AQ}$, $\overline{PQ} \cong \overline{PB} \cong \overline{BQ}$, then m $\angle$ P-AQ-B is 2660



a. 30°
b. 45°
*c. 60°
d. 90°
e. none of the above

COMPUTERS AND DATA PROCESSING

THE STUDENT SHOULD BE ABLE TO RECOGNIZE IMPORTANT DEVELOPMENTS IN THE COMPUTER FIELD BY ORDERING THEM CHRONOLOGICALLY. (3) 0326

The following is a list of important advancements in the computer field.

a. ENIAC
b. HARVARD MARK I
c. BABBAGE DIFFERENCE MACHINE
d. FORTRAN
e. HOLLERITH TABULATING MACHINE

Of these advancements which would chronologically follow e? 4201261

a.
*b.
c.
d.
e.

Which was the most significant in the development of the "stored program concept"? 4201262

a.
*b.
c.
d.
e.

Which of the five is the most recent? 4201263

a.
b.
c.
*d.
e.

THE STUDENT SHOULD KNOW THE FOUR MAJOR DEVELOPMENTS IN COMPUTER TECHNOLOGY SINCE 1940 AS DEMONSTRATED BY CHOOSING A NON-SIGNIFICANT EVENT. (1) 0327

Of the following which was NOT one of the four major developments in computer technology since 1940? 4201264

a. application of solid state devices
b. use of electronic devices to replace mechanical ones
c. the "stored program concept"
*d. improved capability of input/output devices
e. procedural languages

THE STUDENT WILL SHOW KNOWLEDGE OF DEFINITIONS AND PROPERTIES OF PROCEDURAL LANGUAGES BY SELECTING THEM FROM A DEFINITION. (2) 0328

FORTRAN, COBOL, AND ALCOL are called 4201265

a. input devices
*b. procedural languages
c. disk monitors
d. keypunch operations
e. alphameric bit codes

A program written in FORTRAN is executed in a two-part process. That process is 4201266

a. flow-charting and coding
b. coding and execution
c. compilation and revision
*d. compilation and execution
e. coding and de-bugging

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF PROGRAMMING IN COMPILER LANGUAGES BY CHOOSING A DISADVANTAGE. (1) 0336

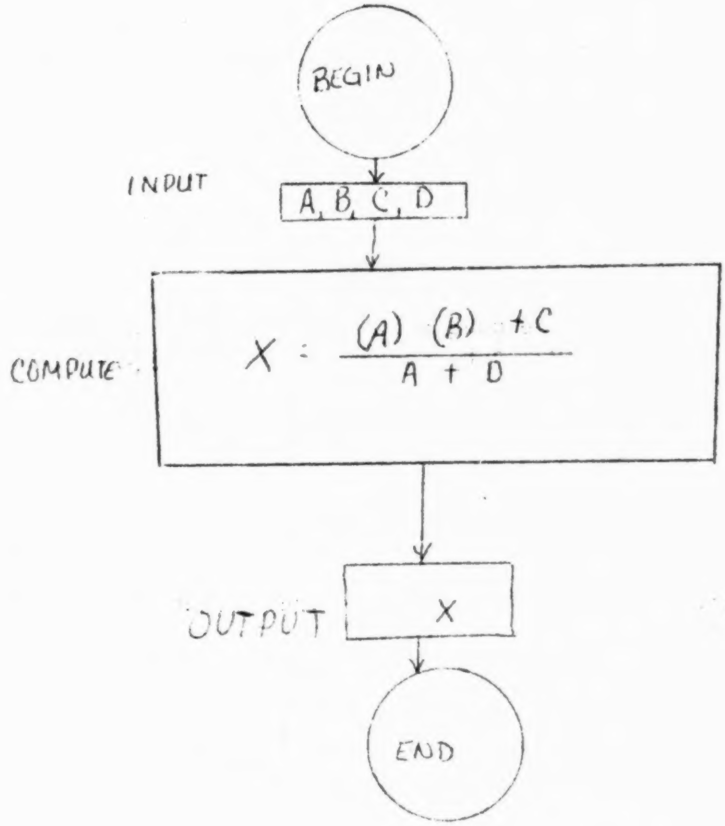
Programming in compiler languages as opposed to machine languages has some disadvantages. Which of the following is one? 4201283

*a. execution time
b. ease of translation from mathematical statements
c. number of instructions involved
d. readability of instructions

THE STUDENT CAN INTEPRET A SIMPLE FLOW CHART DESCRIBING A MATHEMATICAL PROCESS BY CHOOSING THE VARIABLE FOR A GIVEN OPERATION. (5) 0329

(The following five items are a set related to figure (1)

A computer is to be used for processing the current batting average of a baseball player. (The batting average is obtained by dividing the number of times at bat into the number of hits.) Since the "average" changes daily for one player, the input data is comprised of the previous average and number of times at bat, along with the new days hits and "at bats". A programmer developed the flow chart below.


BEGIN
INPUT
A, B, C, D
COMPUTE
X = (A) (B) + C / A + D
OUTPUT
X
END

The input variables represent the four quantities listed (not necessarily in the same order). By observing their use in the computation step, which one must represent the "at bats" for the new day? 4201267

a. A
b. B
c. C
*d. D

Which variable must represent the previous "at bats"? 4201268

*a. A
b. B
c. C
d. D

If this program were to be used again on the following day, the value of X would have to be reassigned to which input variable? 4201269

a. A
*b. B
c. C
d. D

Another programmer suggested a modification of the computation step as follows: 4201270

compute

replace

$$X = \frac{(A)\ (B) + C}{A + D}$$

compute

WITH

$$M = (A)\ (B) + C$$
$$N = A + D$$
$$X = \frac{M}{N}$$

and then output M, N, and X.
How does this improve the program?

a. It breaks the computation process into smaller parts so it is more understandable to the computer.
b. It will require less computation time over many "runs".
*c. The output information is more meaningful to the reader.
d. The program is longer, but easier to code into Fortian.
e. It doesn't significantly improve the program.

In determining the leagues top 10 hitters a certain minimal number of "at bats" is required. If such a test were to be inserted into the program, it would most logically come: 4201271

a. before input
*b. between input and computation
c. between computation and output
d. immediately after output

THE STUDENT WILL DISTINGUISH BETWEEN CHARACTERISTICS OF MACHINE LEVEL PROGRAMMING AND PROCEDURAL LANGUAGE PROGRAMMING BY CHOOSING A DISADVANTAGE OF MACHINE LANGUAGE. (1) 0333

Of the following, which is a disadvantage of machine language programming as opposed to procedural language programming? 4201280

*a. machine dependency
b. compilation time
c. execution time
d. memory requirements
e. none of these

THE STUDENT KNOWS THE OPERATIONAL RELATIONSHIP BETWEEN THE SOURCE PROGRAM AND THE OBJECT PROGRAM AS DEMONSTRATED BY CHOOSING A SIMILIAR ANALOGY. (1) 0334

The "source language" is related to the "object program" in the same way as; 4201281

a. flowcharting is related to problem solving
b. Fortran is related to the source language
*c. flowcharting is related to the source language
d. flowcharting is related to the object program

THE STUDENT CAN ANALYZE A PROGRAMMING ERROR BY SELECTING THE PROBABLE SOURCE. (1) 0341

After successful compilation, if execution occurs with nothing but blanks as output, (i.e., no output after execution), the most probable error is: 4201290

*a. improper coding of the WRITE format
b. an inescapable loop in the program
c. incorrectly punched data
d. reversal of END and CALL EXIT statements
e. none of these

THE STUDENT CAN ANALYZE FORTRAN STATEMENTS TO DETERMINE THE PRESENCE OR NATURE OF CODING ERRORS. (10) 342

The following is a list of 1130 Fortran statements. Choose the letter which corresponds to the number of syntax errors in each statement.

a. no errors
b. one error
c. two errors
d. three errors (assume Format statements, labels, and target labels are valid)

_b_ READ (3,101) A, B, C 4201291

_b_ A + B = 15.0/KOUNT 4201292

_b_ X = SQRT (4.0 * ABS (SQRT(X)) 4201293

_a_ GO to 10 4201294

_d_ WRITE (2,100111), I, J, K, Red, Blue 4201295

_a_ CALLEXIT 4201296

_a_ KOUNT = KOUNT + 1.0 4201297

_a_ IF (X - 2) 3, 4, 5 4201298

_a_ FORMAT (3X, F2.0), 1511, 'is the answer') 4201299

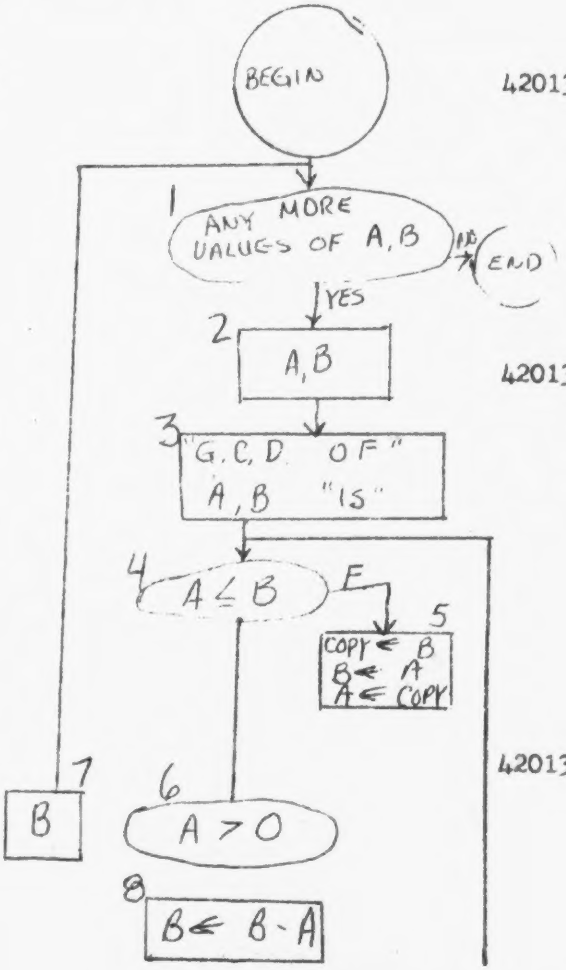
_d_ FORMAT (1X2, 5F7, 3I, 4A4) 4201300

THE STUDENT CAN INTERPRET A PROGRAM INVOLVING SIMPLE CONDITIONALS AND A *COPY FUNCTION* BY SELECTING CORRECT DESCRIPTIONS OF GIVEN STEPS. (10) 0343

The following items refer to the flow chart at the right.

How many values are read during a single execution of the READ step #2? 4201301

a. 1
*b. 2
c. 3
d. 4
e. more than 4


BEGIN
1
ANY MORE VALUES OF A, B
NO
END
YES
2
A, B
3
"G.C.D OF" A, B "IS"
4
A ≤ B
E
5
COPY ← B
B ← A
A ← COPY
6
A > 0
7
B
8
B ← B - A

The primary function of COPY is to 4201302

a. replace A
*b. hold B while A replaces B
c. hold A while B replaces A
d. replace B
e. none of these

If the numbers 21 and 3 are read into the variables A and B respectively, what will be printed at step #7? 4201303

*a. 3
b. 21
c. 24
d. 18
e. nothing

If the numbers 8 and 0 are read into A and B respectively, what will happen at step #8? 4201304

a. B will be replaced by -8
*b. B will be replaced by 8
c. B will be replaced by 0
d. nothing

If the numbers 27 and 9 are read into A and B respectively, how many times will step #8 be executed before output at step #7? 420130

- a. 1
- b. 2
- *c. 3
- d. 4
- e. 5
- f. 6

Which of the following is a correct translation of step #4? 420130

- a. IF (A-B) 5, 5, 5
- b. IF (A+B) 6, 6, 5
- *c. IF (A-B) 6, 6, 5
- d. IF (B-A) 6, 6, 5
- e. none of these

Which of the following is a correct translation of step #2 into Fortran IV? 420130

- *a. READ (A, B)
- b. READ (2, 101)
- c. READ (3, 2) A, B
- d. READ (2, 101) A, B, COPY
- e. READ (2, 2) A, B

The numbers 25 and 15 read-in, in what order will require how many uses of step #5 before output at step #7? 420130

- a. 1
- b. 2
- c. 3
- *d. 4
- e. 5
- f. none of these

With a single pair of input values, how many times is a division operation encountered before output? 420130

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5
- *f. none of these

How many conditional statements are indicated in the flow chart? 4201310

a. 1
b. 2
*c. 3
d. 4
e. 5
f. none of these

THE STUDENT CAN CORRECTLY INTERPRET THE SYMBOL / TO REPRESENT DIVISION IN FORTRAN BY SELECTING THE FORTRAN FORM FOR A GIVEN ARITHMETIC EXPRESSION. (1) 0345

The mathematical expression $\frac{A}{\frac{B}{C}}$ would properly be coded in Fortran as: 4201313

a. A/B/C
b. (A/B) /C
*c. A/(B/C)
d. (A/B/C)

THE STUDENT CAN ANALYZE FORMAT ERRORS COMMON TO F - FORMAT OUTPUT BY DETERMINING THE PRESENCE OR NATURE OF ERRORS. (5) 0346

Directions: With a format specification of F6.3, decide whether each of the core membry values will:

a. be printed correctly and completely
b. not be printed (i.e., blank output)
c. overflow the field on the left
d. be truncated on the right

21 __b__ 4201315

-0.12 __a__ 4201316

-470.1 __c__ 4201317

5.2837 __d__ 4201318

111.12 __c__ 4201319

THE STUDENT CAN DEMONSTRATE UNDERSTANDING THE CYCLIC OPERATION OF A DO - LOOP BY CHOOSING THE NUMBER OF TIMES A GIVEN STATEMENT WILL BE EXECUTED. (3) 0347

In the short program at the right, how many times will statement 20 be executed? 4201320

```
         DO 20 I = 1,10
         DO 20 J = 1, 10,2
         DO 20 M = 1,6
   20    K = K + 1
   30    Continue
            "
            "
            "
            "
```

a. 6
b. 10
c. 200
*d. 300
e. none of these

How many times will statement 30 be executed? 4201321

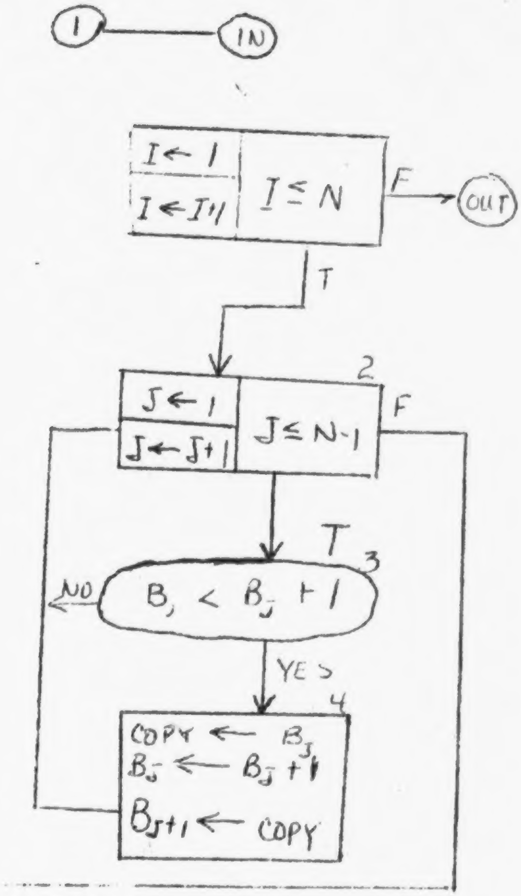
a. 6
b. 10
c. 200
d. 300
*e. none of these

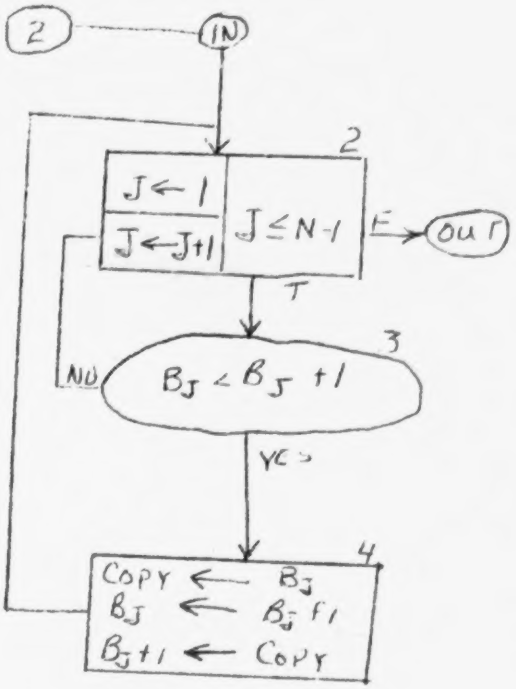
If the counter K were changed to I, the same as the outer-loop counter; how would the loop operation be altered? 4201322

a. statement 20 would be executed 60 times
b. statement 20 would be executed 100 times
*c. the first DO statement would be effectively deleted
d. the third DO statement would be effectively deleted
e. there would be no change in the loop operation

THE STUDENT CAN ANALYZE TWO *DO-LOOP SORT* PROGRAMS BY COMPARING THEM FOR EFFICIENCY. (8) 0348

Below are flowcharts 1 and 2 both to accomplish a sorting of the array B. The following questions refer to them.


1
IN
I ← 1
I ← I+1
I ≤ N
F
OUT
T
2
J ← 1
J ← J+1
J ≤ N-1
F
T
3
NO
B_J < B_J +1
YES
4
COPY ← B_J
B_J ← B_J +1
B_J+1 ← COPY


2
IN
2
J ← 1
J ← J+1
J ≤ N-1
F
OUT
T
3
NO
B_J < B_J +1
YES
4
COPY ← B_J
B_J ← B_J +1
B_J+1 ← COPY

The algorithms are sorting 4201323

*a. from largest to smallest
b. from smallest to largest
c. in both directions simultaneously
d. less than the entire array
e. more than two array elements at one time

One measure of efficiency of a sort program is the maximum number of comparisons (i.e., uses of box #3) required to complete the sort. Given the list 1, 2, 3, 4, 5 in that order, how many comparisons would be used by program 1 to sort the array and exit? 4201324

a. 8
b. 16
*c. 20
d. 24
e. none of these

How many comparisons would be used by program 2 for the same sort and exit? 4201325

a. 8
b. 16
c. 20
*d. 24
e. none of these

One might conclude from questions above that: 4201326

*a. program 1 is more efficient
b. program 2 is more efficient
c. they are each as efficient but 1 would take longer to code.
d. they are each as efficient but 2 would take longer to compile.

How many comparisons would program 1 use to "sort and exit" on the array - - - 5, 4, 1, 2, 3? 4201327

a. 8
b. 16
*c. 20
d. 24
e. none of these

How many comparisons would program 2 use to "sort and exit" on the same array - - - 5, 4, 1, 2, 3? 4201328

a. 8
b. 16
c. 20
d. 24
*e. none of these

Based on the above results one might conclude: 4201329

a. program 1 is more efficient in all cases
*b. program 2 is sometimes more efficient
c. the ordering of the array has no apparent effect on the relative efficiencies

Another criterion for measuring relative efficiency of the two sort programs might be the number of encounters of step #4 (the interchange). As it would apply to programs 1 and 2, rate this method of comparison. 4201330

a. excellent, better than the first method.
b. good, but not as reliable as the previous method.
c. satisfactory, a reliable test in many cases.
*d. very poor, doesn't measure relative efficiency.

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF VARIABLE LENGTH BY SELECTING THE INVALID VARIABLE FROM A LIST. (1) 0349

Which of the following is an invalid variable in 1130-Fortran? 4201331

a. cup
b. cup2
c. cupto
*d. cuptoo
e. hicup

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF INTEGER VARIABLES (1) 0350

Which of the following is a valid integer variable in 1130-Fortran? 4201332

*a. IKE
b. MOTHER
c. 3NN
d. HELP

THE STUDENT CAN TRANSLATE NUMERICAL REPRESENTATION IN BASE 2 AND 1130 MACHINE REPRESENTATION BY CHOOSING THE CORRECT ALTERNATE FORM. (2) 0330

Consider the number $0111111111101000_{(2)}$

It is equivalent to 4201272

a. $7FEE_{(16)}$
*b. $7FE8_{(16)}$
c. $-AA31_{(16)}$
d. $4431_{(16)}$
e. none of these

The same bit configuration in 1130-machine code would represent 4201273

a. 65,515
b. -65,515
*c. -23
d. -14
e. none of these

THE STUDENT SHOULD KNOW BASIC MACHINE CODE FACTS ABOUT THE 1130 COMPUTER BY CHOOSING THE CORRECT CORE CAPACITY AND WORD LENGTH. (2) 0339

In the 1130 computer system a "word" consists of how many bits? 4201286

a. 4
b. 8
*c. 16
d. 32
e. 64

What is the average core capacity of the 1130 computer? 4201287

a. 512,000 words
*b. 8192 words
c. about 16 thousand bits
d. 4096 bits

THE STUDENT DEMONSTRATES KNOWLEDGE OF THE 1130 COMPUTER BY SELECTING THE FORM OF ARITHMETIC EMPLOYED. (1) 0640

In the 1130 computer, all arithmetic is done in: 4201288

a. the storage buffer register
b. floating point or fixed point binary
*c. fixed point binary
d. the Fortran program
e. the compilation process

THE STUDENT WILL BE ABLE TO ORDER FACTS THAT COULD BE CONSIDERED IN DESIGNING A COMPUTER, BY IDENTIFYING THE MOST FUNDAMENTAL FACT IN A GIVEN LIST. (1) 0331

Of the following statements, each contributed to the 1130 computer having a single precision range of -32,768 x 32,767 4201274

Which is the most fundamental?

a. Sixteen bits will produce an even number of bit configurations
b. A choice must be made about which "high order bit" will represent a positive or negative number
c. Of all the possible bit configurations one must be chosen as zero
d. It is desireable to have a machine code which can represent both positive and negative numbers
*e. Much of our arithmetic is based on operations with positive and negative numbers

THE STUDENT KNOWS THE IMPORTANT REASON FOR FACILITY OF FLOATING POINT ARITHMETIC BEING INCORPORATED INTO THE COMPUTER BY SELECTING THIS REASON FROM A LIST. (1) 0340

One good reason for having "floating point" arithmetic is: 4201289

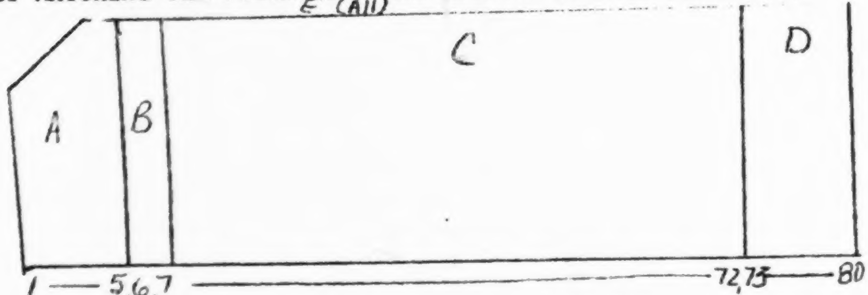
a. it is easier for the computer
*b. the usable number system is extended to the rationals
c. all work is more accurate
d. less time will be used in execution

THE STUDENT SHOULD KNOW THE TERMINOLOGY AND OPERATION OF THE COMPUTER BY CHOOSING THE PURPOSE OF AN ACCUMULATOR. (1) 0337

The basic purpose of the "accumulator" is: 4201284

a. overall control of operations
b. to serve as a buffer register between the memory and the central processing unit
*c. doing arithmetic
d. acting as a storage device for the accumulation of machine instructions
e. none of these

THE STUDENT CAN RECOGNIZE APPROPRIATE COLUMN USAGE ON AN INPUT CARD BY MATCHING THE FIELD WITH ITS APPROPRIATE CONTENTS. (5) 0332



The above input card is divided into zones A,B,C,D

Choose the letter of the zone in which the following could properly be found.

statement labels	A	4201275
card identification	D	4201276
3.1416	E	4201277
READ (2,7) A,B,C	C	4201278
X = 2	C	4201279

THE STUDENT WILL DEMONSTRATE UNDERSTANDING OF *REAL TIME APPLICATION* BY CHOOSING AN EXAMPLE FROM A LIST. (1) 0335

The entrance ramps to an expressway have stop lights that are controlled by the volume of traffic via the computer. This is an example of: 4201282

a. Time sharing
*b. Real time programming
c. Multi-programming
d. Batch processing

THE STUDENT SHOULD KNOW THE MEANING OF *DOCUMENTATION* IN COMPUTER WORK BY CHOOSING A NECESSARY PART OF DOCUMENTATION. (1) 0338

Which of the following would be considered a necessary part of program "documentation"? 4201285

a. keypunching the input date
*b. flow charting the program
c. coding the program into Fortran
d. modifying the program to improve it

THE STUDENT TRANSLATES EBCDIC, HEX, AND BINARY CODING BY CHOOSING THE CORRECT ALTERNATE FORM. (1) 0344

The letter F has an EBCDIC hex-code of C6 and the letter C is represented by C3. The binary core word which simultaneously holds the letters F and C in that order is 4201311

*a. 1100011011000011
b. 1100110011001100
c. 11111100
d. 1100001111000110

CONICS

THE STUDENT CAN SELECT FROM A LIST OF EQUATIONS WHICH ONE IS *NOT* A CENTRAL CONIC, THUS DEMONSTRATING HIS KNOWLEDGE OF CONICS. (1) 0285

Which of the following is NOT a central conic? 4201365

a. circle
b. ellipse
c. parabola
*d. hyperbola

THE STUDENT CAN RECALL THE DEFINITION OF CONIC SECTIONS IN CHOOSING THE CORRECT CONIC FORM FROM A GIVEN LOCUS DESCRIPTION. (1) 0301

Given two points A and B in a plane M and a positive number k greater than AB, the set consisting of all points P in the plane M such that AP + PB = k is called a/an __________. 4201387

a. circle
*b. ellipse
c. parabola
d. hyperbola
e. line

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF EQUATIONS OF CIRCLES BY CHOOSING THE CORRECT EQUATION FOR GIVEN CONDITIONS. (3) 0116

What is the equation of the circle that has(2, 5) as its center and radius 9? 4200300

a. $x^2 - 10x + y^2 - 4y = 52$

*b. $x^2 - 4x + y^2 - 10y = 52$

c. $x^2 - 4x + y^2 - 10y = 20$

d. $x^2 - 10x + y^2 - 4y = -20$

What is the equation of the circle that has as its center (a, b) and radius of c? 4200301

a. $x^2 - 2ax + y^2 - 2yb = c^2$

b. $x^2 - 2b + y^2 - 2ya = c^2 - a^2 - b^2$

*c. $x^2 - 2ax + y^2 - 2yb = c^2 - a^2 - b^2$

d. $x^2 - 2bx + y^2 - 2ya = c^2$

What is the center and radius of the circle $x^2 - 6x + y^2 - 4y = 3$? 4200302

a. (6, 7), 7

b. (6, -4), 3

c. (4, 3), 2

*d. (3, 2), 4

THE STUDENT WILL BE ABLE TO RELATE THE CENTER-RADIUS AND GENERAL FORMS FOR THE EQUATIONS OF CIRCLES TO THE DISTANCE FORMULA, CONDITIONS OF CIRCLES, AND GRAPHS OF CIRCLES BY CHOOSING CORRECT COORDIATES OR DISTANCES IN GIVEN PROBLEMS. (9) 0269

Given the Distance Formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ for the distance between two given points and the equation $x^2 + y^2 = 81$ for a circle or set of all points equidistant from some given point.

By what operation can the Distance Formula be changed to the equation of all points equidistant from (x,y)? 4201031

a. multiplying each side of equation by 2
*b. squaring both sides
c. subtracting $(x_2\ y_2)$ from both sides
d. adding $(x_2\ y_2)^2$ to both sides
e. none of the above

If (x,y) represents the center of the circle above, the coordinates of (x,y) are 4201032

a. (x_2, y_2)

b. (1,1)

c. (9,-9)
*d. (0,0)
e. undetermined

In the Distance Formula d, of course, represents distance. Then the radius of the circle $x^2 + y^2 = 81$ must be 4201033

a. 3
*b. 9
c. 81_2
d. 81
e. undetermined

Considering again the Distance Formula and the equation $(x-2)^2 + (y+9)^2 = 9$ 4201034

The center of this circle is the point

a. (2,3)
b. (2,-3)
c. (2, 3)
d. (2,-3)
*e. none of the above

Where does the point (2,0) lie in relation to the circle? 4201035

a. in the interior
b. on the circle
*c. in the exterior
d. not determinable

How does this circle intersect the coordinate axes? Its intersection is 4201036

a. the x-axis
*b. the y-axis
c. both axis
d. neither axis
e. not determinable

$x^2 + y^2 + 5x - 6y - \frac{3}{4} = 0$ is the general equation of a circle. 4201037

The center-radius equation for this circle is

*a. $(x + 5/2)^2 + (y - 3)^2 = 16$

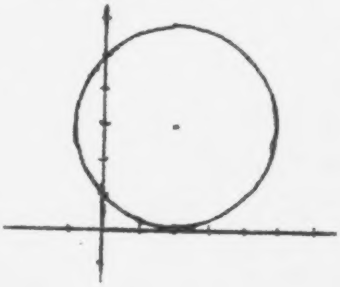
b. $(x + 5/2)^2 + (y - 6)^2 = 3/4$

c. $(x - 5/2)^2 + (y + 3)^2 = 61/4$

d. $(x - 5/2)^2 + (y - 3)^2 = 4$

e. none of the above

The center-radius equation of the circle graphed is 4201038



a. $(x + 2)^2 + (y + 3)^2 = 3$

b. $(x + 2)^2 + (y + 3)^2 = 9$

c. $(x - 2)^2 + (y - 3)^2 = 3$

d. $(x - 2)^2 + (y - 3)^2 = 36$

*e. none of the above

The standard equation for that circle is 4201039

*a. $x^2 + y^2 - 4x - 6y + 4 = 0$

b. $x^2 + y^2 - 4x - 6y + 13 = 0$

c. $x^2 + y^2 + 4x + 6y + 4 = 0$

d. $x^2 + y^2 + 4x + 6y + 10 = 0$

e. none of the above

THE STUDENT CAN SHOW HIS ABILITY TO TRANSLATE AN EQUATION OF A CIRCLE BY IDENTIFYING IT IN STANDARD FORM AND DETERMINING ITS CENTER AND RADIUS. (2) 0412

1. Given the equation $x^2 + 2x + y^2 - 8y = 8$ of a circle rewrite it in standard form. 1605

a. $(x + 1)^2 + (y + 4)^2 = 25$

*b. $(x + 1)^2 + (y - 4)^2 = 25$

c. $(x - 1)^2 + (y - 4)^2 = 25$

d. $(x - 1)^2 + (y + 4)^2 = 25$

2. From the question above determine the center and radius of the circle. 1606

*a. (-1, 4) ; 5
b. (-1, -4;) 5
c. (1, -4) ; 5
d. (1, 4) ; 5

THE STUDENT CAN APPLY THE DISTANCE FORMULA TO EXPRESS ALGEBRAICALLY A GEOMETRIC RELATIONSHIP BY IDENTIFYING THE EQUATION OF A GIVEN CIRCLE. (3) 0416

1. Find the equation of the circle having center at origin and radius 5. 1619

a. $x^2 + y^2 = 5$

b. $x^2 - y^2 = 5$

*c. $x^2 + y^2 = 25$

d. $x^2 - y^2 = 25$

Find the equation of the circle having center at (3, -2) and radius 3. 1620

a. $(x + 3)^2 + (y - 2)^2 = 9$

*b. $(x - 3)^2 + (y + 2)^2 = 9$

c. $(x - 3)^2 + (y - 2)^2 = 9$

d. $(x + 3)^2 + (y + 2)^2 = 9$

3. Find the equation of the circle having center at (-2, -3) and radius 5. 1621

*a. $(x + 2)^2 + (y + 3)^2 = 25$

b. $(x - 2)^2 + (y + 3)^2 = 25$

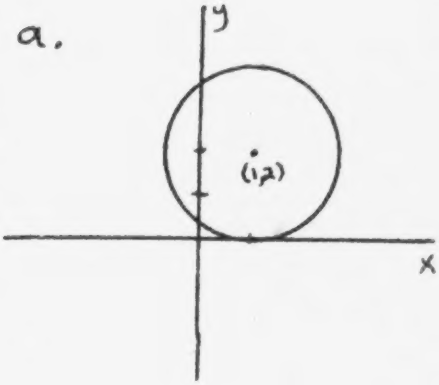
c. $(x - 2)^2 + (y - 3)^2 = 25$

d. $(x + 2)^2 + (y - 3)^2 = 25$

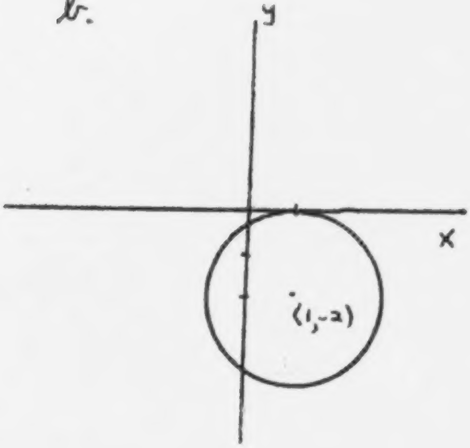
THE STUDENT CAN TRANSLATE AN ALGEBRAIC EQUATION INTO ITS GEOMETRIC GRAPH BY MATCHING A GRAPH OF THE CIRCLE WITH THE EQUATION OF THE CIRCLE. (4) 0417

Directions: Use the graphs below to answer the next four questions by matching them with the given equations in the questions.

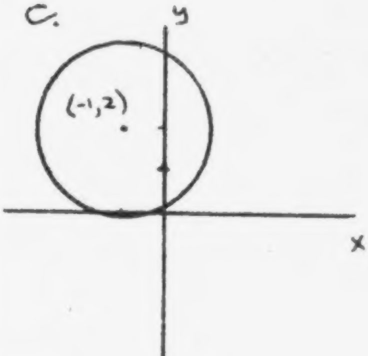
a.



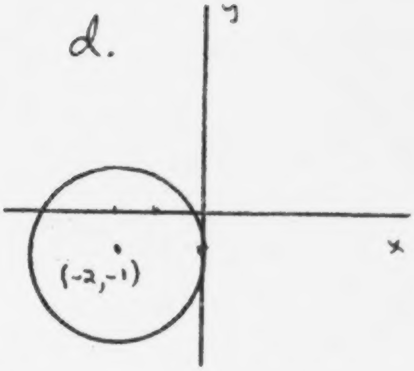
b.



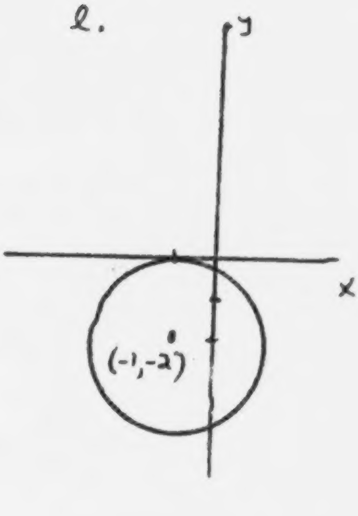
c.



d.



e.



c 1. The graph representing the equation $(x + 1)^2 + (y - 2)^2 = 4$ is _________. 1622

a 2. The graph representing the equation $(x - 1)^2 + (y-2)^2 = 4$ is __________. 1623

e 3. The graph representing the equation $(x +1)^2 + (y+2)^2 = 4$ is __________. 1624

b 4. The graph representing the equation $(x - 1)^2 + (y+2)^2 = 4$ is___________. 1625

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF CIRCLES AND PROPERTIES OF CIRCLES BY IDENTIFYING THE NUMBER OF CIRCLES THAT SATISFY GIVEN CONDITIONS. (5) 0539

The equation of a circle with center (h,k) and radius r is $(x - h)^2 + (y - k)^2 = r^2$

a. one
b. two
c. three
d. four

1. The number of circle(s) that would be tangent to the x-axis at $x = 2$ with a radius of 3 is ___b___. 1971

2. The number of circles tangent to both axes with a radius of 4 is ___d___. 1972

3. The number of circles tangent to the lines $x = y$ and $x = -y$ with a radius of 1 is ___d___. 1973

4. The number of circles that have centers on the lines $x = y$ and $x + y = 4$ with radius of 5 is ___a___. 1974

5. The number of circles that are tangent to both axes and also to the line $x + y = 3$ is___c___. 1975

THE STUDENT RECALLS THE MEANING OF THE BASIC TERMS AND SUBSETS RELATING TO CIRCLES, BY SELECTING TERMS FOR GIVEN DESCRIPTIONS. (6) 0712

1. If A and B are any two distinct points of a circle, then $\overline{AB}$ is called a 2760

 a. radius
*b. chord
 c. diameter
 d. tangent segment

2. In circle O , if A is any point of the circle, then OA is called a 2761

*a. radius
 b. chord
 c. diameter
 d. tangent segment

3. If $\overline{AB}$ is a chord of $\odot O$ and $\overline{AB} \wedge O = \bigcirc$, then which of the following is not necessarily true? 2762

 a. $\underline{AO} = OB$
 b. $\overline{AB}$ is a diameter of the circle
 c. $\underline{AB}$ is twice the length of a radius of the $\odot$
*d. $\overline{AB} \subset \odot O$

4. If point A is in the interior of $\odot O$ and B is any point of the $\odot$, then 2763

 a. $OA \geqslant OB$
*b. $\underline{OA} < OB$
 c. $\overline{AB}$ is a chord of the circle
 d. $OA > AB$

5. If point A is in the exterior of $\odot O$ and point B is in the interior of $\odot O$ and C is any point of the $\odot$, then 2764

a. $OA > OB > OC$.
*b. $OA > OC > OB$.
c. $OC < OB < AB$.
d. $AB < OB < OC$.

6. If A, B, and C are any three points of $\odot O$, then $\angle ABC$ is 2765

a. an acute angle.
b. a central angle.
c. a right angle.
*d. an inscribed angle.

THE STUDENT WILL DEMONSTRATE UNDERSTANDING OF EQUATIONS OF PARABOLAS BY CHOOSING THE CORRECT EQUATION FOR GIVEN FOCUS AND DIRECTRIX. (3) 0117

Determine the equation of the parabola with the focus: (4,0) and directrix $x = -4$. 4200303

*a. $16x = y^2$

b. $16x = y^2 + 32$

c. $x^2 = 16y$

d. $x^2 = 16y + 32$

Determine the equation of the parabola with focus (2, -1) and directrix $x = 8$. 4200304

a. $\frac{-1}{12}(x + 1)^2 + 5 = y$

b. $(y - 5) = (x + 1)^2$

*c. $\frac{-1}{12}(y + 1)^2 + 5 = x$

d. $(x - 5) = (y + 1)^2$

What is the vertex of the equation $y = x^2 + 8x + 19$ 4200305

a. (3, 2)

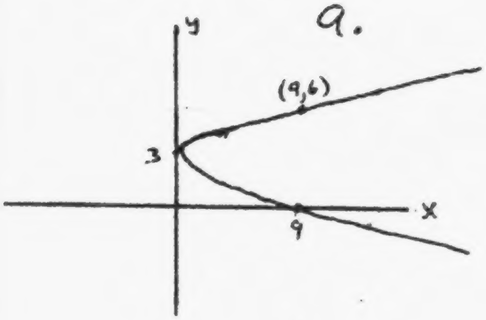
b. (6, -1)

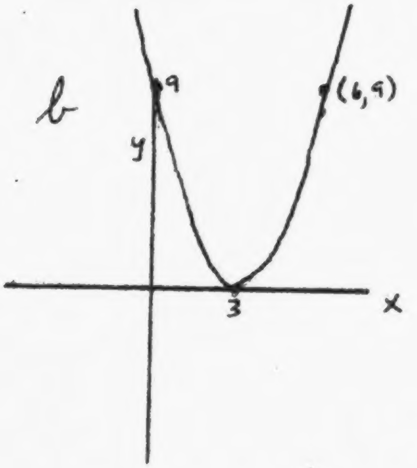
c. (5, -2)

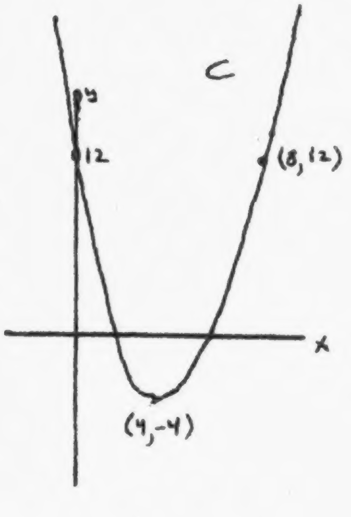
*d. (-4, 3)

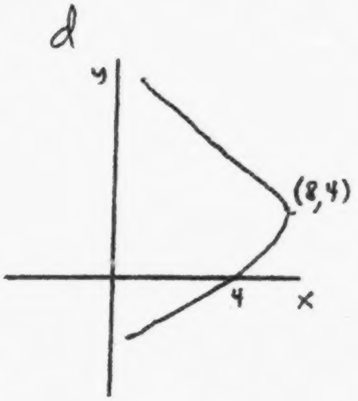
THE STUDENT CAN TRANSLATE AN ALGEBRAIC EQUATION INTO ITS GEOMETRIC GRAPH AS SHOWN BY HIS MATCHING OF THE EQUATION OF A PARABOLA TO ITS GRAPH. (4) 0413

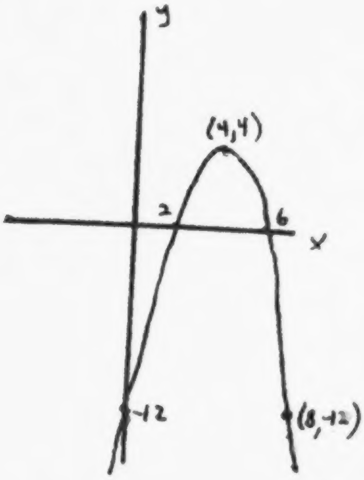
Directions: Use the graphs below to answer the next four questions by matching them with the given equations in the questions.






c
y
12
(8,12)
x
(4,-4)




y
(4,4)
2
6
x
-12
(8,-12)

c 1. The graph representing the equation $y = x^2 - 8x + 12$ is ________. 1607

d 2. The graph representing the equation $4x + y^2 = 8y + 16$ is ________. 1608

e 3. The graph representing the equation $y = -x^2 + 8x - 12$ is ________. 1609

a 4. The graph representing the equation $x = y^2 - 6y + 9$ is ________. 1610

THE STUDENT CAN RECALL THE GENERAL FORM FOR A HYPERBOLA. FROM A LIST OF GENERAL FORMS FOR A CIRCLE, HYPERBOLA, ELLIPSE, AND PARABOLA BY SELECTING THE CORRECT FORM. (1) 0284

The general equation of a hyperbola is ___________. 4201364

a. $x^2 + y^2 = r^2$

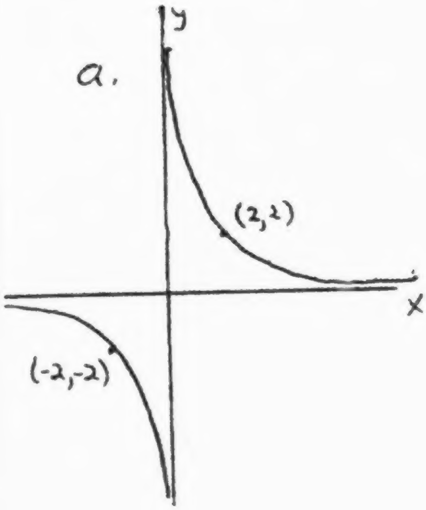
b. $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

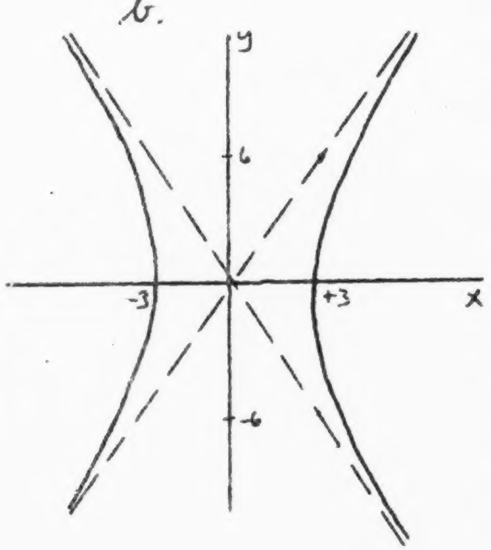
*c. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

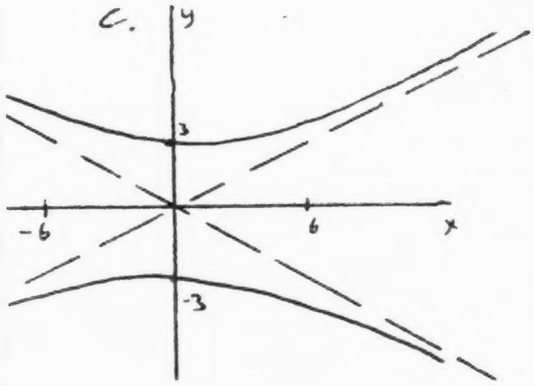
d. $y^2 = 4\ px$

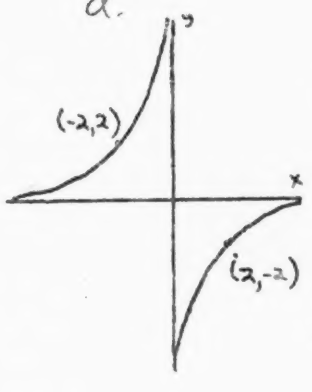
THE STUDENT CAN TRANSLATE AN ALGEBRAIC EQUATION INTO ITS GEOMETRIC GRAPH AS SHOWN BY HIS MATCHING THE EQUATION OF A HYPERBOLA TO ITS GRAPH. (4) 0415

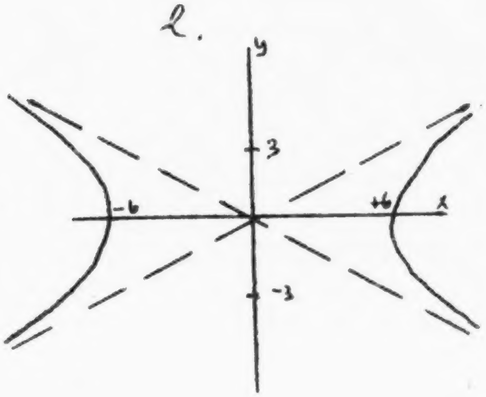
Directions: Use the graphs below to answer the next four questions by matching them with the given equations in the questions.











d 1. The graph representing the equation $xy = -4$ is ________. 1615

c 2. The graph representing the equation $4y^2 - x^2 = 36$ is ________. 1616

b 3. The graph representing the equation $4x^2 - y^2 = 36$ is ________. 1617

a 4. The graph representing the equation $xy = 4$ is __________. 1618

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF ELLIPSES BY SELECTING THE GRAPH OR EQUATION FOR GIVEN CONDITIONS. (3) 0118

Determine the equation of the ellipse whose foci (-1, 0); (1, 0) and the sum of the focal radii is 4. 4200306

a. $\frac{x^2}{8} + \frac{y^2}{8} = 1$

*b. $\frac{x^2}{4} + \frac{y^2}{3} = 1$

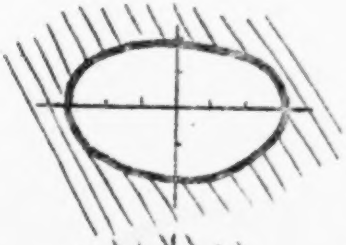
c. $\frac{x^2}{6} + \frac{y^2}{8} = 1$

d. $\frac{x^2}{4} + \frac{y^2}{4} = 1$

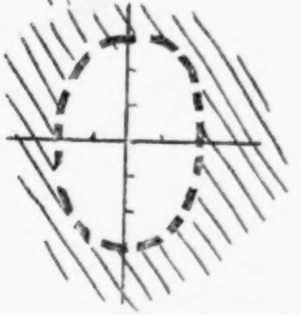
Which of the graphs below is the correct graph of 4200307

$\left\{(x_1\ y) : \frac{x^2}{9} + \frac{y^2}{4} < 1\ ?\right\}$

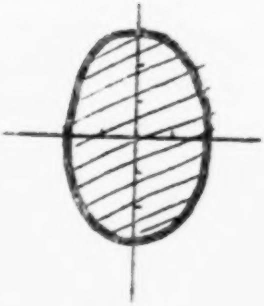
a.



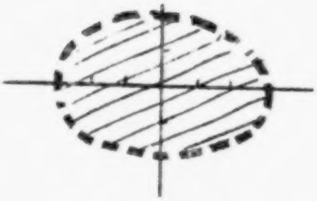
b.



c.



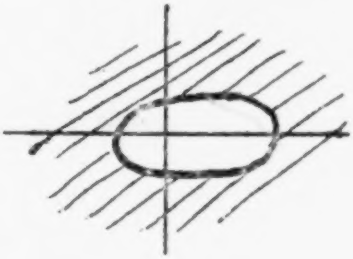
*d.



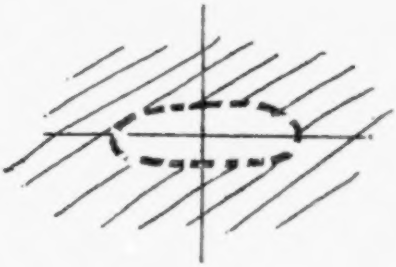
Which graph below is the correct graph of 4200308

$\left\{(x, y) : 25y^2 + 4x^2 \leq 100\right\}?$

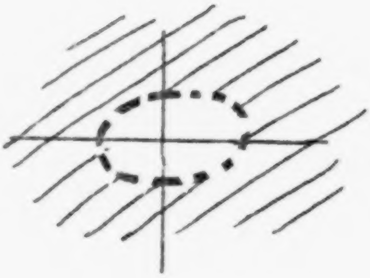
a.



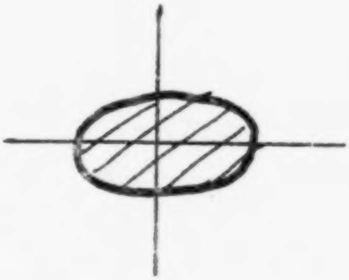
b.



c.

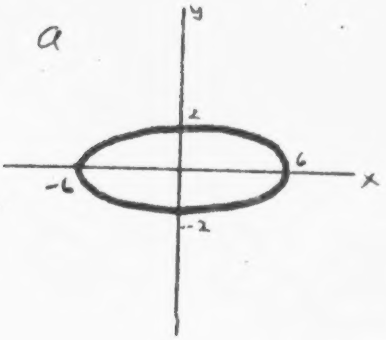


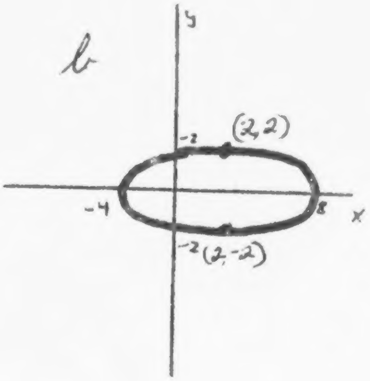
*d.

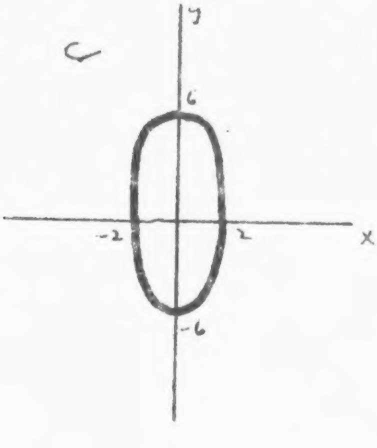


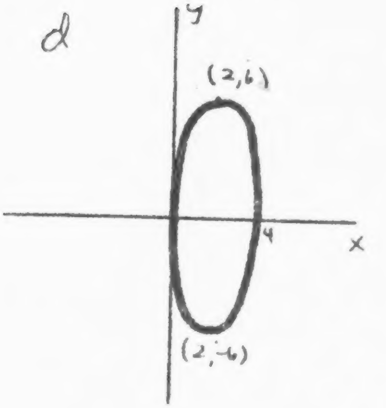
THE STUDENT CAN TRANSLATE AN ALGEBRAIC EQUATION INTO ITS GEOMETRIC GRAPH AS SHOWN BY HIS MATCHING THE EQUATION OF AN ELLIPSE TO ITS GRAPH. (4) 0414

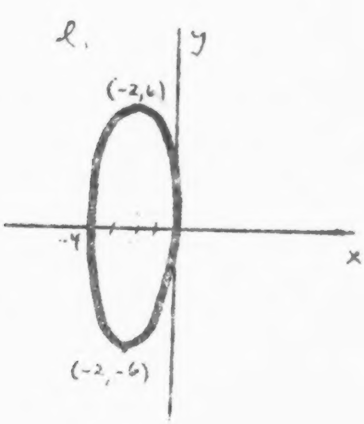
Directions: Use the graphs below to answer the next four questions by matching them with the given equations in the questions.




b
y
(2,2)
2
-4
8
x
-2
(2,-2)







c 1. The graph representing the equation $36x^2 + 4y^2 = 144$ is ________. 1611

d 2. The graph representing the equation $36(x - 2)^2 + 4y^2 = 144$ is ________. 1612

a 3. The graph representing the equation $4x^2 + 36y^2 = 144$ is ________. 1613

b 4. The graph representing the equation $4(x - 2)^2 + 36y^2 = 144$ is ________. 1614

CONSTRUCTION

THE STUDENT WILL BE ABLE TO ANALYZE STATEMENTS ABOUT CONSTRUCTION BY SELECTING A CORRECT CONCLUSION. (5) 0181

Which item is not used when making a construction. 4200601

a. pencil
b. compass
c. straightedge
*d. protractor
e. none of these

Any segment may be divided by construction into 4200602

a. two parts
b. three parts
c. five parts
d. 11 parts
*e. all of above

Which of the following angles is not possible to construct? 4200603

a. 105°

b. $82\frac{1}{2}^\circ$

*c. 37°

d. 75°

e. all of above

f. none of above

Given three segments, it is possible to construct a triangle with these segments if the sum of the lengths of any two sides is 4200604

a. less than the third side.
b. equal to the third side.
*c. more than the third side.
d. makes no difference whatever.

In $\triangle$ ABC, if the length of the altitude from "A" was known, which other parts must be known in order to construct the triangle? 4200605

a. sides b and c
b. angles b and c
c. side b and angle b
*d. all of above are correct answers
e. none of above

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF CONSTRUCTION BY PERFORMING ELEMENTARY CONSTRUCTIONS WITH STRAIGHT EDGE AND COMPASS. (2) 0739

The following problems on constructions with straight edge and compass are most conveniently stated with special notation for the parts of a triangle. With reference to a general triangle referred to as $\triangle$ ABC, the following notation will be used:

the angles of the triangle —— $\angle A$, $\angle B$, $\angle C$
the sides of the triangle —— a, b, c where "a" denotes the side opposite $\angle A$, etc.
the altitudes of the triangle —— h_a, h_b, h_c where h_a is the altitude to side "a", etc.
the medians of the triangle —— m_a, m_b, m_c
the angle bisectors of the triangle —— t_a, t_b, t_c

1. Which of the following conditions are sufficient to determine $\triangle$ ABC ? 3075

a. $\angle A$, $\angle B$, $\angle C$
b. a, b, $\angle A$
*c. a, b, $\angle C$
d. a, b, $\angle B$

2. ABC is determined by which of the following conditions? 3076

*a. h_a, m_a, b where $h_a < m_a < b$
b. h_a, t_a, m_a where $h_a < t_a < m_a$
c. m_a, m_b, a
d. $\angle A$, t_a

DEFINITIONS

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF CERTAIN MATHEMATICAL TERMS BY CHOOSING THEIR CORRECT DEFINITIONS. (9) 0040

A prime number is 420030

a. a number divisible by two.
*b. an integer greater than one that has one and itself as factors.
c. a number that has only one as a factor.
d. is a number of the form 2n.

The greatest common factor of two integers is 4200031

*a. the largest number that is divisible evenly into two integers.
b. the largest number that is not divisible evenly into two integers.
c. the largest number that is divisible into one of the integers.
d. the largest number that is not contained in either of the two integers.

A Quadratic term is a 4200032

a. term of the third degree.
*b. term of the second degree.
c. term of first degree.
d. term of constant degree.

A linear term is a term 4200033

a. of the second degree.
b. of the third degree.
*c. of the first degree.
d. that contains x^2.

A constant term is a 4200034

a. term of the first degree.
b. term of the second degree.
c. term that contains x^2.
*d. numerical term with no variable factor.

A polynomial equation is 4200035

*a. an equation whose left and right members are polynomials.
b. an equation whose left and right members are not polynomials.
c. an equation that contains no variables.
d. an equation that has only two numbers in its solution set.

The standard form of an equation is 4200036

a. an equation that has variable terms on the left and constant terms on the right.
*b. an equation with one of its members equal to zero and the other member a polynomial in which all similar terms are combined.
c. an equation that contains only one variable of the first degree.

The degree of a polynomial equation is 4200037

a. the sum of all the degrees of each variable in the polynomial equation, when the equation is written in standard form.
*b. the greatest of the degrees of the terms of the equation when written in standard form.
c. the same as the number of terms of a polynomial equation, when the equation is written in standard form.

A linear equation is 4200038

a. an equation of the third degree.
b. a polynomial equation written in standard form.
c. the same as a quadratic equation.
*d. an equation of the first degree.

THE STUDENT SHOWS A KNOWLEDGE OF VOCABULARY WORDS AND CONCEPTS BY CHOOSING THE CORRECT DEFINITION FOR EACH WORD. (8) 0061

The value of the abscissa in an ordered pair is 4200105

a. The second coordinate in an ordered pair.
*b. The first coordinate in an ordered pair.
c. The third coordinate in a number triple.

The value of the ordinate in an ordered numbered pair is 4200106

*a. the second coordinate in an ordered pair.
b. the first coordinate in an ordered pair.
c. the third coordinate in a number triple.

The Horizontal axis is the location for 4200107

a. all the positive values of y.
b. all the positive values of z.
*c. all the values, negative and positive for x.
d. all the values, positive and negative for y.

The vertical axis is the location for 4200108

a. all the positive values of x.
b. all the positive values of y.
c. all the values, positive and negative, for x.
*d. all the values, positive and negative for y.

The intersection of the Horizontal and Vertical axes is 4200109

a. the ordinate value of y.
b. the abscissa value of x.
*c. the origin for x and y.
d. the union of x and y.

The axes of the coordinate system divide the plane into four regions called 4200110

a. sub-spaces.
b. parts.
*c. quadrants.
d. half planes.

The slope of line is defined to be the 4200111

a. horizontal change divided by vertical change.
b. horizontal change of a line.
*c. vertical change divided by horizontal change.
d. vertical change of a line.

The y - intercept is an 4200112

a. ordered pair of numbers where the line crosses the x axis.
*b. ordered pair of numbers where the line crosses the y axis.
c. ordered pair of numbers where the line crosses the x axis and y axis.
d. ordered pair of numbers that shows where the line does not cross the x axis and y axis.

THE STUDENT CAN IDENTIFY AN OPEN SENTENCE, THUS DEMONSTRATING HIS KNOWLEDGE OF THE MEANING OF THE TERM *OPEN*. (2) 0218

Which of the following is NOT an example of an open sentence? 4201130

a. $2x + 5 = 8$
*b. $2 + 3 = 5$
c. He is a fine fellow
d. $\frac{1}{2}x - 5 \neq 3$
e. None of these

If $C = \{2, 5, 10, 17, 26\}$, then the open sentence describing C is 4201131

a. $\{3x - 4 \mid x \text{ is an integer between 1 and 7}\}$
b. $\{3x - 1 \mid x \text{ is an integer between 0 and 6}\}$
c. $\{x^2 + 1 \mid x \text{ is an integer between 1 and 5}\}$
*d. $\{x^2 + 1 \mid x \text{ is an integer between 0 and 6}\}$
e. None of these

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF ALGEBRAIC TERMS BY IDENTIFYING THE FOLLOWING TERMS IN ALGEBRAIC EXPRESSIONS - NUMBERICAL COEFFICIENT, VARIABLE, BASE, EXPONENT, TERM, AND FACTOR. (6) 0316

1. If given the expression $6x^2y$, the six is called__________. numerical coefficient 822

2. If given the expression x^2y, the two is called_______. the exponent 823

3. If given the expression $2yz$, the 2, y, and z are called______________. factors 824

4. If given the expression $6x^2 + 3x$, $6x^2$ is called______________. a term 825

5. If given the expression $m + 6$, the m is called_______. a variable 826

6. If given the expression y^5, the y is called____________, and the 5 is _____________. the base the exponent 827

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF INFORMAL DEFINITIONS OF SEGMENT, RAY, AND HALF-LINE BY RELATING THESE DEFINITIONS WITH SYMBOLS AND GEOMETRIC FIGURES. (5) 0496

1. The symbol $\overline{AB}$ represents 1835

a. the line containing points A and B
b. the measure of the segment with endpoints A and B
*c. the segment with endpoints A and B
d. a ray containing points A and B

2. Which of the following holds, with reference to the figure? 1836

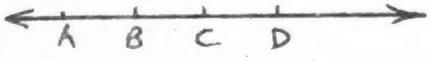
*a. $B \in DC$

b. $\{A\} \subset \overline{BC}$

c. $\overrightarrow{BA} \cap \overrightarrow{BC} = \emptyset$

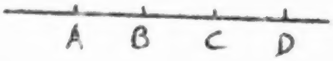
d. $\overline{AB} \cup \overline{BC} = \overleftrightarrow{AC}$

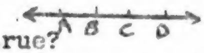
e. $\overrightarrow{BA} = \overrightarrow{AB}$



3. For the figure, $[\overrightarrow{BA} \cup \overrightarrow{CD}] \cap \overline{BC}$ is: 1837

a. a line
b. a ray
c. 1 point
*d. 2 points
e. a segment



4. For the figure  , which of the following statements are true? 1838

I. $\overline{AB} \cap \overrightarrow{BC} = \overrightarrow{AC}$

II. $\overrightarrow{AB} \cap \overrightarrow{DC} = \overline{BC}$

III. $\overrightarrow{BD} \cap \overline{AC} = \overline{BC}$

a. I only
b. II only
*c. III only
d. I and II only
e. I and III only

5. The graph of $\{X \mid X \in \mathbb{R}, X > 2\}$ is a: 1839

*a. half-line
b. ray
c. line
d. segment
e. none of these

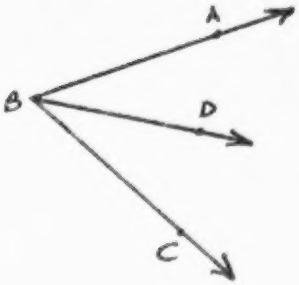
THE STUDENT WILL DEMONSTRATE HIS COMPRESHENSION OF THE DEFINITIONS OF MIDPOINTS AND MIDRAYS, BY SELECTING FROM A LIST OF PROPERTIES, THOSE WHICH DETERMINE MIDPOINTS OR MIDRAYS. (2) 0503

1. Point P bisects $\overline{AB}$ if and only if 1851

a. $d(A,P) + d(P,B) = d(A,B)$
b. A-P-B and $d(A,P) + d(P,B) = d(A,B)$
c. $d(A,P) = d(P,B)$
d. $\overline{AP} \cong \overline{PB}$
*e. A-P-B and $d(A,P) = d(P,B)$

2. In the figure, BD is a midray of ABC. Which of the following statements are true? 1852

I. $\angle ABD \cong \angle DBC$
II. $\angle ABC$ is bisected by $\overrightarrow{BD}$
III. $m\angle ABD + m\angle DBC = m\angle ABC$



a. I only
b. II only
c. III only
*d. I, II, III
e. None of I, II, or III

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO RECALL THE DEFINITION OF TRANSVERSAL BY SELECTING A STATEMENT THAT DEFINES TRANSVERSAL. (1) 0669

1. Which of the following statements are complete correct statements that define the word transversal. 2564

a. A transversal is a segment that intersects two lines in two distinct points.
b. A transversal is a line that intersects two or more coplanar lines.
c. A transversal is a line that intersects two or more lines in distinct points.
*d. None of the above

THE STUDENT CAN DEMONSTRATE HIS KNOWLEDGE OF ALTERNATE INTERIOR ANGLES, AND LINEAR PAIRS BY SELECTING THE APPROPRIATE DESCRIPTIONS FOR EACH. (4) 0670

1. Which combination of the following statements are necessary to describe a pair of alternate interior angles? 2565

    1. They lie on the same side of the transversal
    2. They lie on opposite sides of the transversal
    3. They are both interior
    4. One is interior and one is exterior
    5. They have the same vertex
    6. They have different vertices

a. Statements 1,3, and 5
b. Statements 1,4, and 6
c. Statements 2 and 3
d. Statements 2,3, and 5
*e. Statements 2,3, and 6

2. Which combination of the following statements are necessary to describe a pair of corresponding angles? 2566

    1. They lie on the same side of the transversal
    2. They lie on opposite sides of the transversal
    3. They are both interior
    4. One is interior and one is exterior
    5. They have the same vertex
    6. They have different vertices

a. Statements 1,4, and 5
*b. Statements 1,4, and 6
c. Statements 2 and 3
d. Statements 2, 3 and 5
e. Statements 3, 5 and 6

3. Which combinations of the following statements describe a linear pair? 2567

1. They be on the same side of the transversal
2. They lie on different sides of the transversal
3. They are both interior
4. One is interior and one is exterior
5. They have the same vertex
6. They have different vertices

a. Statements 1,4 and 5
b. Statements 2,4 and 5
c. Statements 2,3 and 5
*d. A and C
e. B and C

4. Which combinations of the following statements describe a pair of vertical angles? 2568

1. They lie on the same side of the tranversal
2. They lie on different sides of the transversal
3. They are both interior
4. One is exterior and one is interior
5. They have the same vertex
6. They have different vertices

a. Statements 1,4 and 5
b. Statements 2,3 and 5
*c. Statemeants 2,4 and 5
d. Statements 2,3 and 6
e. None of the above

THE STUDENT CAN RECALL THE DEFINITION OR DESCRIPTION OF CERTAIN SETS OF POINTS IN GEOMETRY BY MATCHING THE SET OF POINTS WITH A DESCRIPTION. (29) 0724

Directions: Choose the letter of the phrase or word on the right which best describes the meaning or property of the phrase or word or symbol on the left.

2845 c(1) Segment $\overline{AB}$
2846 f(2) Closed ray $\overline{AB}$
2847 b(3) Collinear points
2848 d(4) Coplanar points
g(5) Opposite rays

(a) AB and BA
(b) Points contained in a straight line
(c) Points A and B and/or points between A and B
(d) Points contained in a plane
(e) Points A and B and all points C such that B is between A and C
(f) The union of segment $\overline{AB}$ and all points P such that B is between A and P
(g) AB and AC with A between B and C

2849 c(6) angle
2850 e(7) vertical angles
2851 b(8) acute angles
2852 d(9) right angles
2853 g(10) obtuse angle

(a) the bisector of an obtuse angle
(b) angles whose measure are less than 90 degrees
(c) the union of two non-collinear rays with the same end point
(d) angles whose sides are perpendicular rays
(e) non-adjacent angles formed by two intersecting straight lines
(f) the union of two rays
(g) the supplement of an acute angle

2854	b(11)	Isosceles triangle
2855	f(12)	Acute triangle
2856	g(13)	Equilateral triangle
2857	e(14)	Scalene triangle
2858	a(15)	Right triangle
	d(16)	Obtuse triangle

(a) the measure of one angle of the triangle is equal to the sum of the measures of the other two angles of the triangle
(b) two angles of the triangle are congruent
(c) one angle of the triangle has measure 60 degrees
(d) one angle of the triangle has measure 100 degrees
(e) the lengths of the sides of the triangle are 6, 7 and 8
(f) the measure of each angle of the triangle does not exceed 75 degrees
(g) the altitudes of the triangle have the same length
(h) two angles of the triangle have unequal measures

2859	a(17)	Supplementary angles
2860	c(18)	Adjacent angles
2861	d(19)	Complementary angles
2862	e(20)	Vertical angles

(a) two angles the sum of whose measures is 180 degrees
(b) two angles with the same vertex
(c) two coplanar angles with the same vertex whose interiors do not intersect
(d) the acute angles of a right triangle
(e) the non-adjacent angles formed by two intersecting lines

2863 c(21) Median of a triangle
2864 f(22) Altitude of a triangle
2865 d(23) angle bisector of a triangle
2866 a(24) perpendicular bisector of a side of a triangle

(a) contains all points equidistant from the ends of a segment
(b) divides an angle of a triangle into two acute angles
(c) a segment whose end points are a vertex of a triangle and the mid-point of the opposite side
(d) contains the center of the inscribed circle of a triangle
(e) divides a triangle into two congruent triangles
(f) contains a vertex of a triangle and forms right angles with the line containing the opposite side

2867 f(25) Parallelogram
2868 c(26) rhombus
2869 g(27) rectangle
2870 b(28) square
2871 a(29) trapezoid

(a) a quadrilateral with two sides parallel and opposite angles of unequal measure
(b) a quadrilateral with all right angles and perpendicular diagonals
(c) a quadrilateral in which one diagonal forms two equilateral triangles
(d) a quadrilateral whose diagonals are equal
(e) a quadrilateral whose diagonals are perpendicular
(f) a quadrilateral whose opposite angles are congruent
(g) a quadrilateral whose opposite angles are both congruent and supplementary

DISTANCE FORMULAS

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF THE DISTANCE FORMULA BY DETERMINING THE DISTANCE BETWEEN TWO POINTS IN SIMPLE RADICAL FORM. (2) 0401

1. Find the length of the line segment joining the points, (2, 3); (6, 5). 1569

a. 20
b. $\sqrt{20}$
c. $4\sqrt{5}$
*d. $2\sqrt{5}$

2. Find the length of the line segment joining the points (- 4, - 3); (- 5, - 10). 1570

a. $2\sqrt{5}$
*b. $5\sqrt{2}$
c. $\sqrt{50}$
d. $25\sqrt{2}$

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE PROCESS TO COMPUTE THE DISTANCE BETWEEN POINTS BY FINDING D(A,B) GIVEN THE COORDINATES OF POINTS A AND B. (3) 0495

1. Find d(A,B) if the coordinate of A is 74 and the coordinate of B is 29 1832

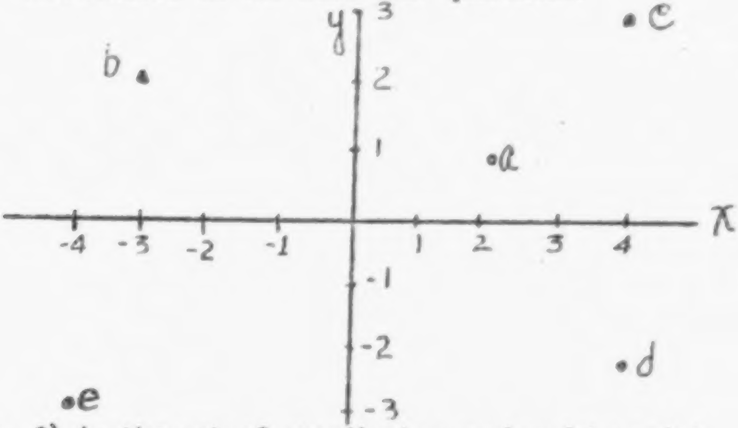
a. 103
b. 55
c. −55
d. −45
*e. 45

2. Find d(A,B) if the coordinate of A is −18 and the coordinate of B is 15. 1833

a. −3
b. 3
c. 33
*d. 33
e. 18

THE STUDENT CAN TRANSLATE INTO ALGEBRA THE GEOMETRIC CONCEPT OF DISTANCE BY ASSIGNING COORDINATES TO POINTS IN A DRAWING. (4) 0404

Directions: Select the point which corresponds to the coordinates in the next four questions.



C 1. (4, 3) is the set of coordinates assigned to point______. 1575

e 2. (-4, -3) is the set of coordinates assigned to point_____. 1576

b 3. (-3, 2) is the set of coordinates assigned to point_____. 1577

d 4. (4, -2) is the set of coordinates assigned to point_____. 1578

THE STUDENT DEMONSTRATES HIS ABILITY TO APPLY THE DISTANCE FORMULA BY SELECTING THE CORRECT DISTANCE FOR A GIVEN PAIR OF COORDINATES. (4) 0115

Find the distance between the coordinates (6, 2) and (-5, 4). 4200296

a. $-5\sqrt{5}$
b. 125
*c. $5\sqrt{5}$
d. 118

Find the coordinates of A if M is the midpoint of line segment AB given M (7, -3); B (5, 4). 4200297

*a. A (9, -10)
b. A (19, -2)
c. A (3, 11)
d. A (17, 5)

Find all possibilities for y given A (8, 1) and B (7, y) such that the length of the line segment AB is 2. 4200298

a. 3, -2
b. 4, 1
c. $\emptyset$
*d. 0, 2

Find the midpoint of the base given the vertices of an isosceles triangle A B C where A (6,4); B (-2,4); C (2,7) 4200299

a. (4, 2)

*b. (2, 4)

c. $(3, \frac{11}{2})$

d. $(4, \frac{11}{2})$

THE STUDENT APPLIES HIS KNOWLEDGE OF THE DISTANCE FORMULA BY CHOOSING THE CORRECT DISTANCE FOR A GIVEN DESCRIPTION. (2) 0142

Find the distance between two points if P is 5 units from the origin, with position angle 17° and Q is 3 units from the origin, with position angle 107°. 4200389

a. $\sqrt{30}$
b. $\sqrt{37}$
*c. $\sqrt{34}$
d. $\sqrt{38}$

Find the distance between two points if M(-6,0) and N is $4\frac{1}{2}$ units from the origin with a position angle of 25°. 4200390

*a. $\sqrt{105}$
b. $\sqrt{111}$
c. $\sqrt{97}$
d. $\sqrt{99}$

3. Find d(A,B) if the coordinate of A is a and the coordinate of B is b . 1834

a. a-b
b. a+b
c. |a+b|
*d. |a-b|
e. b-a

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF THE MID-POINT FORMULAS BY DETERMINING THE COORDINATES OF THE MIDPOINT OF A LINE SEGMENT. (2) 0402

1. Find the coordinates of the midpoint of the line segment with end points (12, 7); (- 3, 5). 1571

a. (7½, 1)

b. (6, 4½)

c. (1, 7½)

*d. (4½, 6)

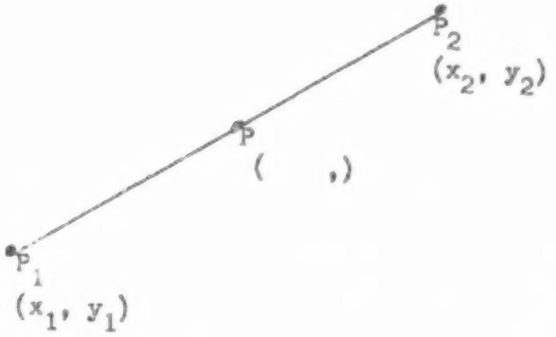
2. Find the coordinates of the midpoint of the line segment with endpoints (3, 4) ; (-7, 6). 1572

*a. (-2, 5)
b. (5, -2)
c. (-5, 1)
d. (1, - 5)

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE THE PROCEDURE FOR DERIVING THE COORDINATES OF THE MIDPOINT OF A LINE SEGMENT BY IDENTIFYING THE COORDINATES OF A POINT P THAT DIVIDES THE SEGMENT INTO TWO UNEQUAL SEGMENTS. (1) 0550

1. If P_1 (x_1, y_1) and P_2 (x_2, y_2) then the coordinates of the midpoint of $P_1 P_2$ are $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$. 2001

Consider 0 k 1 and P is between P_1 and P_2 on the line segment $P_1 P_2$ then the x coordinate of P so that $P_1 P = k (P_1P_2)$ are:



a. $kx_2 - kx_1$

b. $\frac{x_2 + x_1}{k}$

c. $kx_2 + kx_1 - x_1$

*d. $kx_2 - kx_1 + x_1$

THE STUDENT CAN APPLY HIS KNOWLEDGE OF THE DISTANCE AND/OR SLOPE FORMULA BY CALCULATING INFORMATION ABOUT A GIVEN QUADRILATERAL AND/OR ITS PARTS. (6) 0171

Directions: Use this information for the following items.
Given: Quadrilateral ABCD with A (2,3)
B (-1,4)
C (0,7)
D (4,4)

To find the slope of $\overline{AB}$ use the following method : 4200560

a. $\frac{3-4}{2-1}$

b. $\frac{4+3}{-1+2}$

c. $\frac{2-3}{-1-4}$

d. $\frac{3-4}{2+1}$

The distance between vertices C and D is found by using the following method : 4200561

a. $\sqrt{(7-4)^2 + (4)^2}$

b. $\sqrt{(4-0) + (4-7)}$

c. $\sqrt{4^2 + 11^2}$

d. $\sqrt{(3^2) + (4^2)}$

The relationship between $\overline{AB}$ and $\overline{BC}$ is that the lines are 4200562

a. parallel .
b. perpendicular .
c. skew lines .
d. colinear .

Diagonal $\overline{AC}$ is ______________ $\overline{BD}$. 4200563

a. Longer than
b. Shorter than
c. Equal to
d. Perpendicular to

The most precise name for Polygon ABCD is a 4200564

*a. Quadrilateral.
b. Rectangle.
c. Trapezoid.
d. Rhombus.

The midpoint of $\overline{BC}$ is 4200565

a. $(-\frac{1}{2}, \frac{3}{2})$

b. $(-1,-2)$

*c. $(-\frac{1}{2}, \frac{11}{2})$

d. $(\frac{1}{2}, \frac{3}{2})$

EQUATIONS

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE FAMILIES OF EQUATIONS BY DETERMINING THEIR COMMONALITIES. (1) 0278

The following three equations $y - 2 = x + 3$; $y - 2 = -(x + 3)$; $y - 2 = -(x + 3)$ have what in common? 4201349

a. same slope
b. same y-intercept
*c. are concurrent
d. are coincident

THE STUDENT WILL DEMONSTRATE UNDERSTANDING OF TRUTH SETS BY CHOOSING THE TRUTH SET OF A GIVEN OPEN SENTENCE. (6) 0014

Which of the following open sentences has 6 as its truth set? 4201427

a. $x - 12 = 6$
b. $2x - 3 = 8$
c. $9x = 56$
*d. $3x + 2 = 20$

Given the open sentences whose domain is the set of numbers of arithmetic.

a. $4x - 3 = 5$
b. $x + 1 < 3$
c. $2x + 3 - 5$
d. $3x + 5 = 11$
e. $13x = 39$

Which of the following is true? 4201428

a. c and b have the same truth set
* b. a and d have the same truth set
c. d and c have the same truth set
d. e and d have the same truth set

If the domain of the variable is 0, 1, 2, 3, . . .9, 10 what is the truth set of the open sentence $2x + 1 \geq 9$? 4201429

*a. $\{4, 5, 6, \ldots 9, 10\}$
b. $\{0, 1, 2, 3, 4\}$
c. $\{5, 6, 7, 8, 9, 10\}$
d. $\{0, 1, 2, 3\}$

Given: a. $4x + 2 = 6x - 2$

b. $x + 5 = 2x$

c. $x + 7 > 11$

d. $x + 6 = 13$

e. $2x + 7 < 10$

Match one of the given open sentences with the open sentences below which have the same truth set. Assume the domain of the variable is 1, 2, 3, 4, 5, 6, 7

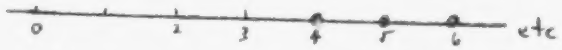
$4x - 5 = 3x$ * b 4201430

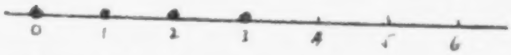
$5x + 4 = x + 8$ * e 4201431

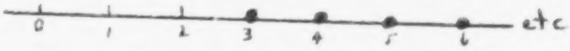
$3x - 6 > 12$ * d 4201432

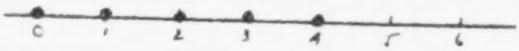
THE STUDENT IS ABLE TO GRAPH THE TRUTH SET OF A GIVEN OPEN SENTENCE BY CHOOSING THE CORRECT GRAPH REPRESENTING THE NEW OPEN SENTENCE. (2) 0016

Given the open sentence, $3x + 1 \geq 10$ and the domain of the variable is the set of whole numbers then the graph of the truth set is 4201435

a.


b.


* c.


d.


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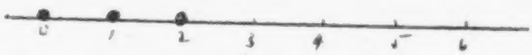
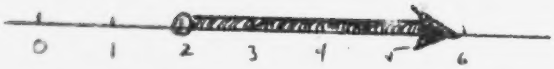


Given 

Which of the following open sentences will have as the graph of its truth set the given graph? Assume the domain of the variable for all sentences to be the set of numbers of arithmetic. 4201436

a. $x + 1 < 3$

b. $2x + 1 \geqslant 5$

c. $x \nless 2$

d. $3x + 5 > 14$

*e. $4x - 2 > 6$

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE DEFINITION OF *AND* AND *OR* COMPOUND SENTENCES BY INDICATING THE TRUTH VALUE OF THE CLAUSES GIVEN THE TRUTH VALUE OF THE COMPOUND SENTENCE AND CONVERSELY. (5) 0017

If an "or" sentence is true then the right clause is 4201437

a. always true
*b. sometimes true
c. never true

If an "or" sentence is false then the right clause is 4201438

a. always true
b. sometimes true
*c. never true

If an "and" sentence is true then the left clause is 4201439

*a. always true
b. sometimes true
c. never true

If the right clause of an "and" sentence is false then the "and" sentence is 4201440

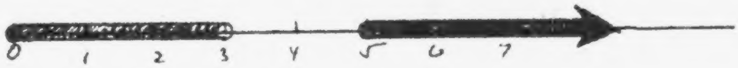
a. always true
b. sometimes true
*c. never true

If the left clause of an "or" sentence is false then the "or" sentence is 4201441

a. always true
*b. sometimes true
c. never true

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO GRAPH THE TRUTH SETS OF COMPOUND SENTENCES BY CHOOSING THE CORRECT TRUTH SET FOR A GIVEN GRAPH. (3) 0018

Given:



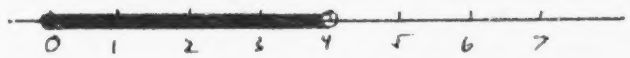
Which of the following open sentences will have the given graph as the graph of its truth set? Let {numbers of arithmetic} be the domain of the variable. 4201442

a. $x > 3$ or $x \leq 5$
b. $x < 3$ and $x \geq 5$
c. $x < 3$ or $x > 5$
d. $x > 3$ and $x < 5$
*e. $x < 3$ or $x \geq 5$

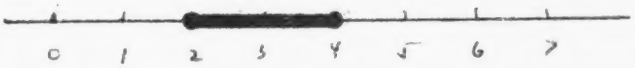
Given:

a. $x < 4$ and $x < 6$
b. $x > 2$ or $x \leq 4$
c. $x > 2$ and $x \leq 4$
d. $x \leq 2$ or $x \leq 4$
e. $x \geq 2$ and $x \leq 4$

Select the compound open sentence that fits the graphs below and place the letter associated with the sentence in the appropriate space.



*a. 4201443



*e. 4201444

GIVEN AN OPEN SENTENCE WITH FRACTIONAL COEFFICIENTS THE STUDENT DEMONSTRATES UNDERSTANDING OF A SOLUTION SET BY CHOOSING THE CORRECT SET FOR THE SENTENCE. (2) 0059

The solution set for the open sentence $\frac{n + 5}{12} - \frac{n + 3}{8} = 1$ is 4200099

a. $n = 1$

*b. $n = -23$

c. $n = -5$

d. $n = -17$

The solution set for the open sentence $\frac{3}{4x} + \frac{1}{x} = \frac{7}{8}$ is 4200100

*a. $x = \frac{8}{4}$

b. $x = \frac{8}{7}$

c. $x = \frac{49}{8}$

d. $x = -\frac{49}{8}$

THE STUDENT SHOWS HIS UNDERSTANDING OF ORDERED PAIRS OF NUMBERS THAT SATISFY A LINEAR EQUATION BY SELECTING THE CORRECT PAIRS FOR EACH EQUATION. (3) 0062

Given the equation $y = 3x$, a set of points that satisfy the equation is 4200113

a. $(1,3)$, $(0,0)$, $(2,4)$

b. $(3,9)$, $(\frac{1}{2},2)$, $(1/3,1)$

c. $(-3, -9)$, $(-2, 6)$, $(-1, -3)$

*d. $(-1/3, -1)$, $(-2, -6)$, $(-4, -12)$

A set of points that satisfy the equation $2x + 3y = 6$ is 4200114

*a. $(0,2)$ $(3,0)$, $(-1, \frac{8}{3})$

b. $(1, \frac{4}{3})$, $(6, -2)$, $(3, -4)$

c. $(-2, 6)$, $(-3, 4)$, $(\frac{1}{2}, \frac{5}{3})$

d. $(4, -2/3)$, $(0, 2)$, $(-6, 2)$

The y - intercept of the equation $x - y = 5$ is 4200115

a. $(5, 0)$

*b. $(0 -5)$

c. $(1, -4)$

d. $(2, -3)$

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE EQUATIONS WITH RATIONAL COEFFICIENTS BY CHOOSING THE CORRECT SOLUTION FOR EACH EQUATION. (5) 0096

Solve for b : $\frac{b+1}{2} + \frac{b-1}{7} = \frac{16}{7}$ 4200233

*a. $b = 3$

b. $b = \frac{25}{9}$

c. $b = \frac{34}{9}$

d. $b = 5$

Solve for y : $1 + \frac{9}{y} = 2$ 4200234

a. $y = 7$

b. $y = \frac{1}{3}$

*c. $y = 9$

d. $y = 3$

Solve for w : $\frac{1}{w - 1} - \frac{2}{w} = 0$ 4200235

a. $w = 3$

b. $w = -1$

c. $w = \frac{3}{2}$

*d. $w = 2$

Solve for a : $\frac{a + 2}{2a - 6} + \frac{3}{3 - a} = \frac{a}{2}$ 4200236

a. $a = -2$

*b. $a = 2$

c. $a = 3$

d. $a = 0$

Solve for y : $\frac{y + 3}{3 - y} + \frac{3y + 1}{y^2 - 9} = \frac{1 - 5y}{y + 3}$ 4200237

*a. $-\frac{1}{4}, 5$

b. $\frac{1}{5}, 4$

c. $-\frac{1}{3}, 6$

d. $\frac{1}{2}, 4$

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF SOLVING QUADRATIC OR HIGHER DEGREE EQUATIONS BY SELECTING THE CORRECT SOLUTION FOR A GIVEN EQUATION. (5) 0103

Solve for x : $36x^2 = 49$ 4200258

a. $\left\{ \frac{-6}{7}, \frac{6}{7} \right\}$

*b. $\left\{ \frac{7}{6}, \frac{-7}{6} \right\}$

c. $\left\{ \frac{-49}{36}, \frac{49}{36} \right\}$

d. $\left\{ -\sqrt{13}, 13 \right\}$

Solve for T : $27T^3 - 343 = 0$ Find rational roots 4200259

a. $\left\{ \left(\sqrt[3]{7} \cdot \sqrt[3]{3} \right) / 3 \right\}$

b. $\left\{ \frac{\sqrt[3]{7}}{\sqrt[3]{3}} \right\}$

*c. $\left\{ \frac{7}{3} \right\}$

d. $\left\{ 7 \right\}$

Solve for R : $R^2 + 6R - 16 = 0$ 4200260

a. $\left\{ 0 \right\}$

b. $\left\{ 16, 1 \right\}$

c. $\left\{ -16, 1 \right\}$

*d. $\left\{ -8, 2 \right\}$

Solve for a : $6a^2 + 2a = 0$ 4200261

a. $\left\{ 0, \frac{1}{3} \right\}$

*b. $\left\{ -\frac{1}{3}, 0 \right\}$

c. $\{ 2, -5 \}$

d. $\{ 10, 13 \}$

Solve for x : $x^2 - 10 = 3x$ 4200262

a. $\left\{ \frac{10}{3}, -\frac{10}{3} \right\}$

*b. $\{ 5, -2 \}$

c. $\{ 2, -5 \}$

d. $\{ 10, 13 \}$

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE EQUATIONS THAT CONTAIN REAL NUMBERS AS EXPONENTS BY CHOOSING THE CORRECT SOLUTION FOR GIVEN EQUATIONS. (3) 0122

Solve for n: $4^{n-1} = \frac{1}{2}(4n-1)$ 4200321

*a. $n = \frac{1}{2}$

b. $n = 0$

c. $n = 1$

d. $n = 4$

Solve for x : $10^{x + 1} = 10^{3x + 4}$ 4200322

a. $x = \frac{2}{3}$

b. $x = -\frac{3}{4}$

c. $x = \frac{1}{2}$

*d. $x = -\frac{3}{2}$

Solve for c : $9^{c-1} = 27^{c}$ 4200323

a. $c = -1$

b. $c = -\frac{1}{2}$

c. $c = 0$

*d. $c = -2$

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE AN EQUATION OVER THE SET OF COMPLEX NUMBERS BY CHOOSING THE CORRECT SOLUTION SET FOR A GIVEN EQUATION. (2) 0139

Solve the equation $2x^2 + 4x + 7 = 0$ over the set of omplex numbers. 4200379

*a. $\frac{-2 \pm i\sqrt{10}}{2} = x$

b. $\frac{2 \pm 3i\sqrt{10}}{4} = x$

c. $\frac{7 \pm 2i\sqrt{3}}{6}$

d. $\frac{4 \pm i\sqrt{2}}{5}$

Solve the equation $3n^2 = 5n - 7$ over the set of complex numbers. 4200380

a. $n = \frac{3 \pm 2i\sqrt{13}}{4}$

b. $n = \frac{7 \pm 3i\sqrt{59}}{6}$

*c. $n = \frac{5 \pm i\sqrt{59}}{6}$

d. $n = \frac{6 \pm 5i\sqrt{23}}{6}$

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF ALGEBRAIC EQUATIONS BY TANSLATING A SENTENCE INTO AN ALGEBRAIC EQUATION AND CALCULATING THE SOLUTION OF THE EQUATION. (2) 0173

Which equation should you use in solving this problem: The measure of one of two complementary angles is 15 less than twice the measure of the other. 4200572

a. $x - 15 = 90 - x$

b. $x = 2(x - 90) - 15$

*c. $x = 2(90 - x) - 15$

d. $2x + 15 = 90 - x$

The measure of the larger angle is 4200573

a. 52.5

b. 25

*c. 55

d. 32.5

THE STUDENTS WILL BE ABLE TO SOLVE FIRST DEGREE EQUATIONS CONTAINING ONE VARIABLE BY CHOOSING FROM AMONG ALTERNATIVES THE CORRECT SOLUTION. 0182 (5)

Find the value of x in the equation $2x + 3x = 15$. 4200606

a. $x = 15$
b. $x = -15$
*c. $x = 3$
d. $x = -3$
e. $x = 1/3$
f. $x = -1/3$

Find the value of y in the equation $7y - y = 24$. 4200607

a. $y = 3$
*b. $y = 4$
c. $y = 5$
d. $y = 6$
e. None of above

Solve for "W" in the equation $4W - \frac{1}{2}W = 7$. 4200608

a. $w = 14/9$
*b. $w = 2$
c. $w = 22$
d. $w = 14/9$
e. $w = -2$
f. $w = -22$

Solve for x in the equation, $1x + 9x + 3x = 76 - 2x$. 4200609

a. $x = 76/6$
b. $x = 38$
c. $x = 76/11$
*d. $x = 76/15$
e. $x = -76/.7$
f. None of the above

Solve for x in the equation $\frac{2}{3}x = 10$. 4200610

a. $x = 9\frac{1}{3}$

b. $x = 10\frac{2}{3}$

*c. $x = 15$

d. $x = \frac{20}{3}$

e. None of the above

THE STUDENT WILL BE ABLE TO SOLVE A FIRST DEGREE ALGEBRAIC EQUATION IN ONE VARIABLE, THUS DEMONSTRATING THAT HE CAN APPLY METHODS OF FINDING SOLUTIONS. (9) 0221

The solution for the equation $x + 12 = 18$ is 4201135

a. -6
b. 30
*c. 6
d. None of the above

The solution for the equation $x - 5 - 8 = 40$ 4201136

a. 27
*b. 53
c. 43
d. None of the above

The solution for the equation $\frac{2}{3}d = 6$ is 4201137

*a. 9
b. 4
c. $5\frac{1}{3}$
d. None of the above

The solution for the equation $2x - 3 = 15$ is 4201138

a. 6
b. 24
c. 36
*d. None of the above

The solution for the equation $x - 4.2 = .73$ is 4201139

a. 1.15
b. .31
*c. 4.93
d. None of the above

The solution for the equation $\frac{3}{2} + \frac{x}{3} = \frac{7}{2}$ is 4201140

a. 15
b. $\frac{2}{3}$
*c. 6
d. None of these

The solution for the equation $x + 2(7+1) = 40$ is 4201141

a. 3
b. $\frac{40}{16}$ or $2\frac{1}{2}$
c. 56
*d. None of these

The solution for the equation $\frac{5}{x - 3} = \frac{5}{18}$ is 4201142

*a. 21

b. 15
c. undeterminable
d. None of these

The solution for the equation $\frac{5b + 6}{3} = 0$ is 4201143

a. 0
*b. $-1\frac{1}{5}$

c. -11
d. None of these

THE STUDENT SHOULD DEMONSTRATE HIS ABILITY TO SOLVE EQUATIONS *AND INEQUALITIES* INVOLVING ABSOLUTE VALUE BY CHOOSING THE CORRECT SOLUTION SETS. (4) 0271

All integral values of x for which the equation $|x - 4| = 10$ are included in ___________. 4201336

a. $\{^{+}14, ^{-}14\}$

b. $\{^{+}14\}$

*c. $\{^{+}14, ^{-}6\}$

d. $\{^{+}6, ^{-}6\}$

The solution set for the inequality $4 \leq |y| < 9$ is ___________. 4201337

a. $\{4, 5, 6, 7, 8, 9\}$

b. $\{4, 5, 6, 7, 8\}$

c. $\{-9, -8, -7, -6, -5, -4, 4, 5, 6, 7, 8, 9\}$

*d. $\{-8, -7, -6, -5, -4, 4, 5, 6, 7, 8\}$

e. $\{. . . -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8\}$

Which of the following inequalities is equivalent to $15x - 12 < 33 + 6x$? 4201338

a. $-22x > -45$

b. $22x < 21$

*c. $45 > 9x$

d. $-9x < 45$

For all real values of a, c, d, if $c < d$ then ________. 4201339

a. $ac < ad$
b. $ac > ad$
c. either $ac < ad$ or $ac > ad$
*d. either $ac < ad$, $ac > ad$, or $ac = ad$

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVES EQUATIONS INVOLVING COMPLEX NUMBERS BY SELECTING THE CORRECT SOLUTION. (1) 0286

The values for x and y for which $(2x-y) + (x+5y)i = (5-13i) - (7+10i)$ is ___________. 4201366

a. $(^{-13}/11,\ ^{-4}/11)$

b. $(^{-4}/11,\ ^{-13}/11)$

c. $(^{-}4,\ ^{-}3)$

*d. $(^{-}3,\ ^{-}4)$

e. None of the above

THE STUDENT CAN UNDERSTAND THE SOLVING OF AN EQUATION INVOLVING COMPLEX NUMBERS BY USING THE DEFINITION OF EQUALITY OF COMPLEX NUMBERS TO OBTAIN THE VALUES OF VARIABLES INVOLVED IN TERMS OF REAL NUMBERS. (2) 0392

1. Determine real numbers x and y for which the equation $(x = y\,i) - (6 - 8\,i) = 4 + 2\,i$ is true. 1541

a. $x = -6$ and $y = 10$
b. $x = -10$ and $y = -6$
*c. $x = 10$ and $y = -6$
d. $x = 10$ and $y = 6$

2. Determine real numbers x and y for which the equation $x + 11\,y\,i = 4\,i + (-7 + 7\,i)$ is true. 1542

*a. $x = -7$ and $y = 1$
b. $x = -7$ and $y = -1$
c. $x = 7$ and $y = 1$
d. $x = 7$ and $y = -1$

THE STUDENT WILL BE ABLE TO ANALYZE THE PROCEDURE NECESSARY TO SOLVE AN EQUATION BY CHOOSING THE CORRECT OPERATION. (8) 0209

In order to solve the equation $x + 10 = 3$, the following operation must be performed. 4200783

a. add 10 to each side
*b. subtract 10 from each side
c. multiply each side by 3
d. divide each side by 3
e. none of the above

In order to solve the equation $3/5x = 10$, the following operation must be performed. 4200784

a. add 3/5 to each side
b. subtract 3/5 from each side
*c. multiply each side by the reciprocal of 3/5
d. divide each side by the reciprocal of 3/5
e. none of above

In order to solve the equation $-2x = -3x + 10$, the following operation must be performed. 4200785

a. add 2x to each side
*b. add 3x to each side
c. divide each side by 2
d. divide each side by 3
e. none of the above

In order to solve the equation $2x = 32$, the following operation must be performed. 4200786

a. add 2 to each side
b. subtract 32 from each side
c. multiply each side by 2
d. divide each side by the reciprocal of 2
*e. none of the above

In order to solve the equation $2x = -3x + 10$, the following operations might be performed:

I: add 3x to each side
II: subtract 3x from each side
III: multiply each side by 1/5
IV: multiply each side by -1

The correct steps in the correct order are: 4200787

*a. step I, then step III
b. step II, then step IV
c. step I, then step IV
d. step II, then step III
e. none of the above

In order to solve the equation $6/5x - 4 = 10$, the following operations might be performed:

I: multiply each side by 5/6
II: divide each side by 5/6
III: add four to each side
IV: subtract four from each side

The correct steps in the correct order are: 4200788

*a. III, then I
b. IV, then I
c. III, then II
d. IV, then II
e. none of the above

In order to solve the equation $-3x + 4 = -8$, the following operations might be performed:

I: multiply each term by -1
II: multiply each term by 1/3
III: add 4 to each side
IV: divide each side by 4
V: add 8 to each side

The correct operations in the correct order are: 4200789

a. V, I, and II
b. III, I and II
c. II, I, and IV
*d. I, III, and II
e. none of the above

In order to solve the equation $1/2x = 1/3x - 4$, the following operations might be performed:

I: multiply each side by 6
II: subtract $1/3x$ from each side
III: add $1/3x$ to each side
IV: Multiply each side by $6/5$
V: multiply each side by $5/6$

The correct operations in the correct order are: 4200790

a. III, then IV
*b. II, then I
c. III, then V
d. II, then IV
e. none of the above

THE STUDENT CAN ANALYZE THE SOLUTION OF A SYSTEM OF LINEAR EQUATIONS BY CHOOSING THE STEP CONTAINING AN ERROR. (3) 0250

Consider the following work:

$2x + y = 18$
$5x - 3y = 1$

a. $6x + 3y = 54$
$5x - 3y = 1$
b. $11x = 55$
c. $x = 5$
d. $10 + y = 18$
$y = 8$
e. $\{(5,8)\}$

The error in the above work, if one exists, occurs in 4201243

a. a
b. b
c. c
d. d
*e. none of the above; there is no error.

Consider the following work:

$5x + 2y = 18$
$3x - 3y = 9$

a. $15x + 6y = 54$
$6x - 6y = 18$
b. $9x = 36$
c. $x = 4$
d. $20 + 2y = 18$
e. $2y = -2$
f. $y = -1$

$\{(4,-1\}$

The error in the above work, if one exists, occurs in 4201244

a. a
*b. b
c. d
d. f
e. none of the above; there is no error.

Consider the following work:

$11x + 4y = 10$
$3x - y = 18$

a. $11x + 4y = 10$
$3x - 4y = 18$
b. $14x = 28$
c. $x = 2$
d. $22 + 4y = 10$
e. $4y = -12$
f. $y = -3$

$\{(2, -3)\}$

The error in the above work, if one exists, occurs in 4201245

*a. a
b. b
c. d
d. e
e. none of the above; there is no error.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO EVALUATE METHODS OF SOLVING EQUATIONS BY SELECTING THE BEST METHOD OF SOLUTION. (2) 0625

1. The best way to begin to solve $3x + 15 = 42$ is to 2230

a. divide every term by 3.
*b. add (−15) to both members of the equation.
c. subtract 42 from both members of the equation.
d. add (−3x) to both members of the equation.

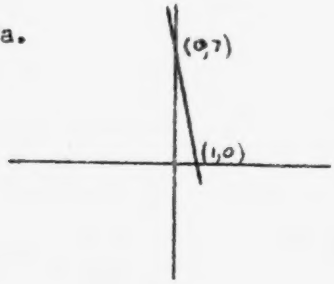
2. The best way to begin to solve $5x - 3x + 12 = 20$ is to 2231

*a. add (5x − 3x) first.
b. add (−12) to both members of the equation.
c. add 3x to both members of the equation.
d. subtract 20 from both members of the equation.

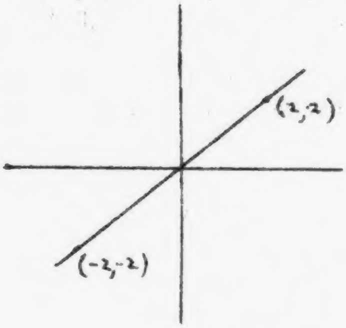
THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF GRAPHING A LINEAR EQUATION IN TWO UNKNOWNS BY SELECTING THE CORRECT GRAPH FOR A GIVEN EQUATION. (2) 0063

Which of the graphs below best represent the graph of $7x + y = 7$. 4200116

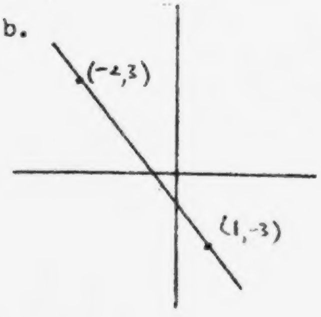
*a.



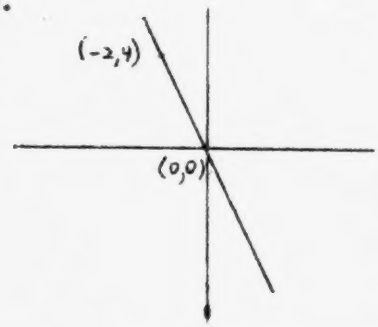
c.



b.

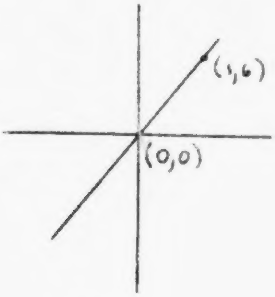


d.

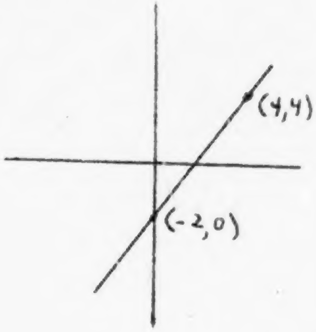


The graph of $x + y = 4$ is best represented by which of the graphs below? 4200117

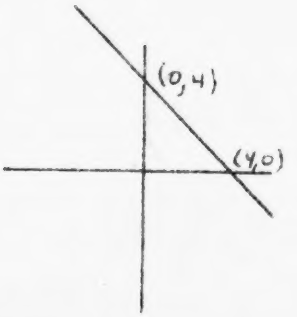
a.



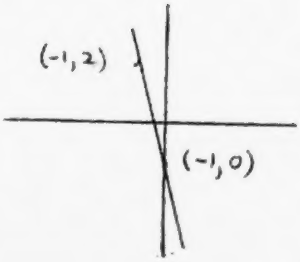
c.



*b.



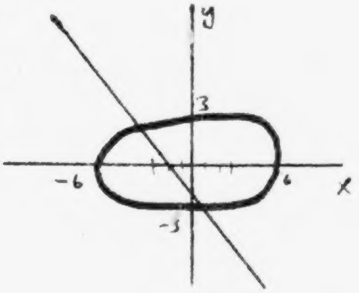
d.



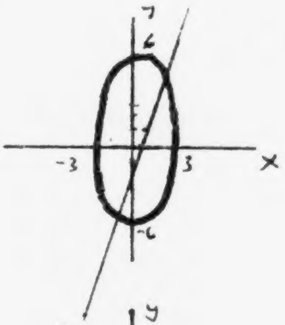
THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE INTERSECTION OF (A) A LINEAR EQUATION WITH A QUADRATIC EQUATION (B) A QUADRATIC EQUATION WITH A QUADRATIC EQUATION BY CHOOSING THE GRAPH, EQUATION, OR SOLUTION OF A GIVEN PAIR OF EQUATIONS. (4) 0120

The intersection of $2x - y = 1$ and $4x^2 + y^2 = 36$ is illustrated by which graph below? 4200312

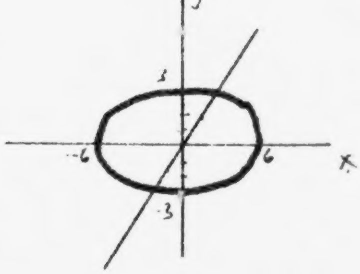
a.



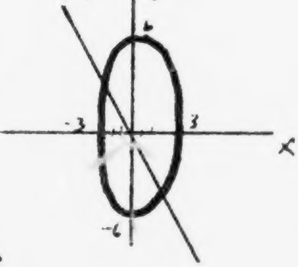
*c.



b.



d.



Which procedure below yields the correct intersection of $\frac{3}{x} + \frac{8}{y} = 3$ and $2x - y = 2$?

4200313

a. (1) $\frac{3}{x} + \frac{8}{y} = 3$

(2) $y = 2x + 2$

$\frac{3}{x} + \frac{8}{2x + 2} = 3$

$6x + 6 + 8x = 6x^2 + 6x$

$0 = 6x^2 - 8x - 6$

$0 = 3x^2 - 4x - 3$

$x = (\frac{1}{3}, 3)$

$\{(\frac{1}{3}, -\frac{4}{3}), (3, 4)\}$

*b. $\frac{3}{x} + \frac{8}{y} = 3$

$y = 2x - 2$

$\frac{3}{x} + \frac{8}{2(x-1)} = 3$

$6x - 6 + 8x = 3(2x^2 - 2x)$

$0 = 6x^2 - 20x + 6$

$0 = 3x^2 - 10x + 3$

$x = (\frac{1}{3}, 3)$

$\{(\frac{1}{3}, -\frac{4}{3}), (3, 4)\}$

c. (a) $2x - y = 2$

(b) $y = \frac{8}{3} x - \frac{8}{3}$

$2x - \frac{8}{3} x - \frac{8}{3} = 2$

$-\frac{2}{3} x = \frac{14}{3}$

$x = -7$

$\{-7, -16\}$

d. $\frac{3}{x} + \frac{8}{y} = 3$

$x = \frac{y + 2}{2}$

$\frac{3}{\frac{y + 2}{2}} + \frac{8}{y} = 3$

$\frac{y + 2}{6} + \frac{8}{y} = 3$

$y^2 + 2y + 48 = 18y$

$y^2 - 16y + 48 = 0$

$(y - 4)(y - 12) = 0$

$y = (4, 12)$

$\{(3, 4) (\frac{9}{7}, 12)\}$

Which procedure below yields the correct intersection of $3x^2 - 2y^2 = 9$ and $x^2 - y^2 = -1$? 4200314

a.
$$\begin{aligned}
&3x^2 - 2y^2 = 9\\
&\underline{-(x^2 - y^2 = 1)}\\
&2x^2 = 10\\
&x^2 = 5\\
&x = \pm\sqrt{5}
\end{aligned}$$
$$\left\{ \begin{array}{l} (\sqrt{5}, \sqrt{3}),\ -\sqrt{5}, -\sqrt{3} \\ (\sqrt{5}, -\sqrt{3}),\ (-\sqrt{5}, \sqrt{3}) \end{array} \right\}$$

b.
$$\begin{aligned}
&3x^2 - 2y^2 = 9\\
2\ &\underline{(-x^2 + y^2 = 1)}\\
&x^2 = 7\\
&x = \pm\sqrt{7}
\end{aligned}$$
$$\left\{ \begin{array}{l} (\sqrt{7}, \sqrt{6}),\ (-\sqrt{7}, -\sqrt{6}) \\ (\sqrt{7}, -\sqrt{6}),\ (-\sqrt{7}, \sqrt{6}) \end{array} \right\}$$

*c.
$$\begin{aligned}
&3x^2 - 2y^2 = 9\\
2\ &\underline{(-x^2 + y^2 = 1)}\\
&x^2 = 11\\
&x = \pm\sqrt{11}\\
&y = \pm 2\sqrt{3}
\end{aligned}$$
$$\left\{ \begin{array}{l} (\sqrt{11}, 2\sqrt{3}),\ (-\sqrt{11}, -2\sqrt{3}) \\ (-\sqrt{11}, 2\sqrt{3}),\ (\sqrt{11}, -2\sqrt{3}) \end{array} \right\}$$

d.
$$\begin{aligned}
&3x^2 - 2y^2 = 9\\
&y^2 = 1 + x^2\\
&3x^2 - 2(1 + x^2) = 9\\
&x^2 = 7\\
&x = \pm\sqrt{7}
\end{aligned}$$
$$\left\{ \begin{array}{l} (\sqrt{7}, \sqrt{6}),\ (-\sqrt{7}, -\sqrt{6}) \\ (\sqrt{7}, -\sqrt{6}),\ (-\sqrt{7}, \sqrt{6}) \end{array} \right\}$$

Which procedure below yields the correct solution to the intersection of $2x^2 + 3y^2 = 23$ 4200315

$$3x^2 - y^2 = 7$$

*a.

$$\begin{array}{rl} 2x^2 + 3y^2 & = 23 \\ \underline{3(3x^2 - y^2} & \underline{= 7)} \\ 11x^2 & = 44 \\ x^2 & = 4 \\ x & = \pm 2 \\ y & = \pm\sqrt{5} \end{array}$$

$$\left\{ \begin{array}{ll} (2, \sqrt{5}), & (2, -\sqrt{5}) \\ (-2, \sqrt{5}), & (-2, -\sqrt{5}) \end{array} \right\}$$

b.

$$\begin{array}{rl} 2x^2 + 3y^2 & = 23 \\ \underline{-(3x^2 - y^2} & \underline{= 7)} \\ -7x^2 & = -28 \\ x^2 & = 4 \\ x & = \pm 2 \\ x & = \pm\sqrt{5} \end{array}$$

$$\left\{ \begin{array}{ll} (2, \sqrt{5}), & (2, -\sqrt{5}) \\ (-2, \sqrt{5}), & (2, -\sqrt{5}) \end{array} \right\}$$

c.

$$\begin{array}{rl} 2x^2 + 3y^2 & = 23 \\ \underline{-(3x^2 - y^2} & \underline{= 7)} \\ -x^2 & = 16 \\ x^2 & = -16 \\ x & = \emptyset \end{array}$$

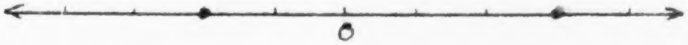
d.

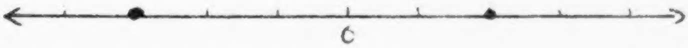
$$\begin{array}{rl} 2x^2 + 3y^2 & = 23 \\ \underline{3x^2 - y^2} & \underline{= 7} \\ 2x^2 + 3(3x^2 + 7) & = 23 \\ 2x^2 + 9x^2 + 21 & = 23 \\ 11x^2 & = 2 \\ x & = \pm\sqrt{\frac{2}{11}} \\ y & = \pm\sqrt{\frac{6}{11}} \end{array}$$

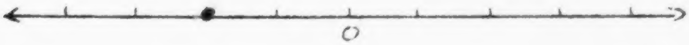
$$\left\{ \begin{array}{ll} \left(\sqrt{\frac{2}{11}}, \sqrt{\frac{6}{11}}\right), & \left(\sqrt{\frac{2}{11}}, -\sqrt{\frac{6}{11}}\right) \\ \left(-\sqrt{\frac{2}{11}}, \sqrt{\frac{6}{11}}\right), & \left(-\sqrt{\frac{2}{11}}, -\sqrt{\frac{6}{11}}\right) \end{array} \right\}$$

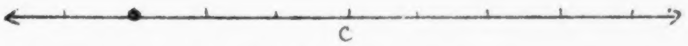
THE STUDENT CAN SOLVE LINEAR AND/OR QUADRATIC EQUATIONS BY TRANSLATING THE RESULT INTO GRAPHIC REPRESENTATION. (4) 0168

The graph of A = x : $x^2 + 5x + 6 = 0$ is 4200551

a.


b.


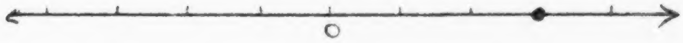
c.


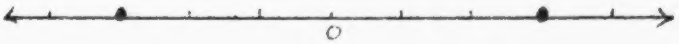
d.


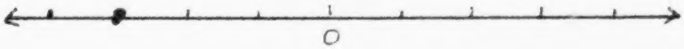
*e. The union of c and d

The graph of B = $\{x: x^2 = 9\}$ 4200552

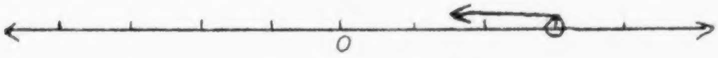
a. ∅

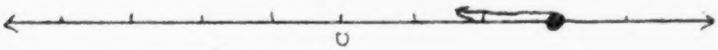
b.


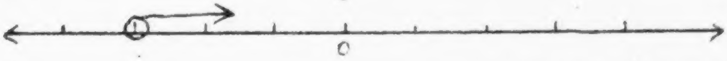
*c.


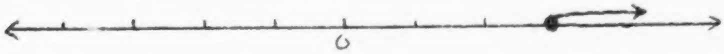
d.


The graph of C = $\{x : x<3\}$ is 4200553

*a.


b.


c.


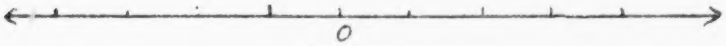
d.


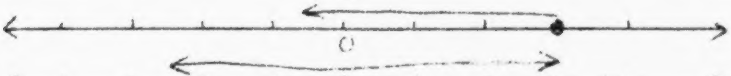
The graph of A ⋀ B ⋀ C when 4200554

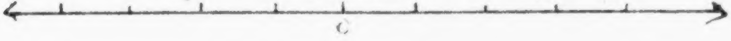
$A = \{x:x^2 + 5x + 6 = 0\}$

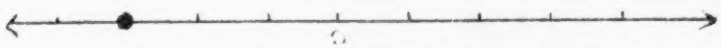
$B = \{x:x^2 = 9\}$

$C = \{x:x \leqslant 3\}$ is

a.


b.


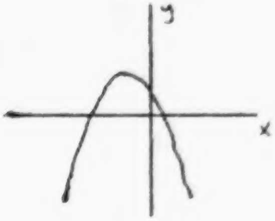
c.


*d.


THE STUDENT WILL DEMONSTRATE HIS ABILITY TO SOLVE QUADRATIC FUNCTIONS GRAPHICALLY BY CHOOSING THE CORRECT GRAPHICAL SOLUTION.(2) 0307

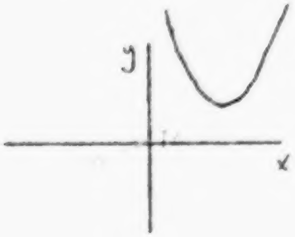
Select the graph and the corresponding maximum or minimum of the following $x^2 + 6x + 11$ 4200482

a.



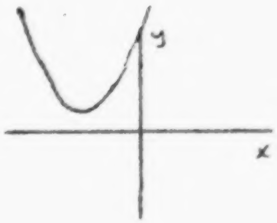
max. pt. (-3,2)

b.



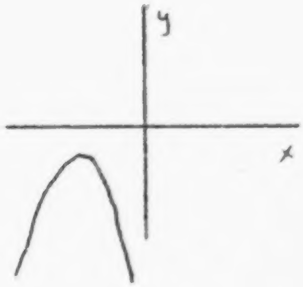
min. pt. (3,2)

*c.



min. pt. (-3,2)

d.

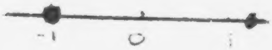


max. pt. (-3,-2)

Which represents the solution set of $\frac{x-1}{x^2-9} - \frac{3x+5}{x+3} = \frac{x+3}{x-3}$ 4200483

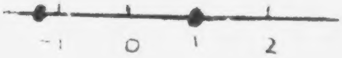
a. $\left\{-1, \frac{5}{4}\right\}$

b.



c. $\left\{1, \frac{5}{4}\right\}$

*d.



THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF GRAPHICAL REPRESENTATION OF EQUATIONS BY MATCHING AN EQUATION WITH ITS GEOMETRIC PICTURE. (9) 0407

Directions: Use the responses below to answer the next 9 questions. Each of the given equations has one of the 5 responses as its geometric picture.

a. circle
b. line
c. parabola
d. ellipse
e. hyperbola

e 1. $x^2 - y^2 = 400$ 1587

a 2. $x^2 + y^2 = 25$ 1588

a 3. $x^2 + y^2 - 4y + 3 = 24$ 1589

d 4. $16x^2 + 25y^2 = 400$ 1590

c 5. $y - x^2 = 49 - 14x$ 1591

e 6. $x^2 - 3y^2 = 4$ 1592

b 7. $x + 2y = 5$ 1593

c 8. $y = 3x^2 - 4x$ 1594

e 9. $xy = 6$ 1595

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO COMPREHEND WHETHER THE GRAPHS OF THE EQUATIONS ARE PARALLEL LINES, THE SAME LINE, OR INTERSECTING LINES BY IDENTIFYING EACH PAIR OF EQUATIONS ACCORDINGLY. (3) 0622

1. The graphs of $x + 2y = 7$ and $x + 2y = -3$ are 2221

*a. parallel lines.
b. the same line.
c. intersecting lines.

2. The graphs of $x + 2y = 7$ and $3x + 6y = 21$ are 2222

a. parallel lines.
*b. the same line.
c. intersecting lines.

3. The graphs of $2x - 6y = 10$ and $3x - 6y = 11$ are 2223

a. parallel lines.
b. the same line.
*c. intersecting lines.

THE STUDENT DEMONSTRATES HIS ABILITY TO FIND A QUADRATIC EQUATION BY CHOOSING THE CORRECT EQUATION FOR GIVEN ROOTS. (2) 0110

What is the quadratic equation that has roots $\{2, -3\}$? 4200282

a. $x^2 + 5x - 6 = 0$

b. $x^2 - x + 6 = 0$

*c. $x^2 + x - 6 = 0$

d. $x^2 + 5x + 6 = 0$

What is the quadratic equation that has roots $(2\sqrt{2}, \frac{\sqrt{2}}{2})$? 4200283

*a. $x^2 - \frac{5\sqrt{2}}{2} x + 2 = 0$

b. $x^2 + \frac{3}{2}\sqrt{2}x + 2 = 0$

c. $x^2 + \frac{5}{2}\sqrt{2}\, x + 2 = 0$

d. $x^2 + \frac{3}{2}\sqrt{2}\, x - 2 = 0$

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE QUADRATIC EQUATIONS USING THE PROPERTY OF SQUARE ROOTS OF EQUAL NUMBERS BY CHOOSING THE CORRECT SOLUTION SET FOR EACH EQUATION. (4) 0087

The solution set for m in the quadratic equation $27m^2 - 3 = 0$ is 4200196

*a. $m = \{1/3, -1/3\}$

b. $m = \{3, -3\}$

c. $m = \{3\sqrt{3}, -3\sqrt{3}\}$

d. $m = \{\sqrt{3}, -\sqrt{3}\}$

The solution set for R in the quadratic equation $3R^2 - 75 = 0$ is 4200197

a. $R = \{\sqrt{3}, -\sqrt{3}\}$

b. $R = \{-3, \sqrt{5}\}$

c. $R = \{\sqrt{3}, \sqrt{5}\}$

*d. $R = \{5, -5\}$

Which of the following solutions sets is the correct solution set for T in the quadratic equation $(T-6)^2 = 5$? 4200198

a. $T = \{11, -11\}$

b. $T = \{6, -6\}$

*c. $T = \{6 + \sqrt{5}, 6 - \sqrt{5}\}$

d. $T = \{11 + \sqrt{5}, \sqrt{5} - 11\}$

Find the solution for z in the quadratic equation $4(z + 3)^2 = 25$. 4200199

*a. $z = \{-\frac{1}{2}, -\frac{11}{2}\}$

b. $z = \{\frac{5}{2}, -\frac{5}{2}\}$

c. $z = \{-8, -2\}$

d. $z = \{7, -3\}$

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE A QUADRATIC EQUATION USING THE METHOD OF COMPLETING THE SQUARE BY CHOOSING THE CORRECT SOLUTION FOR EACH ITEM. (6) 0088

Solve for x by completing the square $x^2 + 6x + 4 = 0$. 4200200

a. $x = \{3 + \sqrt{14}, 3 - \sqrt{14}\}$

*b. $x = \{-3 + \sqrt{5}, -3 - \sqrt{5}\}$

c. $x = \{4 + 4\sqrt{7}, 4 - 4\sqrt{7}\}$

d. $x = \{0, -6\}$

Solve for y by completing the square $y^2 - 4y + 3 = 0$. 4200201

a. $y = \{-2, -2\}$

b. $y = \{2 + \sqrt{7}, 2 - \sqrt{7}\}$

*c. $y = \{3, 1\}$

d. $y = \{2 + \sqrt{3}, 2 - \sqrt{3}\}$

Solve for m by completing the square $4m^2 + 11m - 3 = 0$. 4200202

a. $\{66, -55\} = m$

b. $\{\frac{3}{4}, 2\} = m$

c. $\{0, -11\} = m$

*d. $\{\frac{1}{4}, -3\} = m$

Solve for x by completing the square: $x^2 + 4x + 2 = 0$. 4200203

*a. $x = \{-2 - \sqrt{2}, -2 + \sqrt{2}\}$

b. $x = \{4 + \sqrt{2}, 4 - \sqrt{2}\}$

c. $x = \{\sqrt{2}, -\sqrt{2}\}$

d. $x = \{\sqrt{2}, 3\sqrt{2}\}$.

Solve the equation $3x^2 + 6x + 1 = 0$ by completing the square. 4200204

a. $\{3 + \sqrt{6},\ 3 - \sqrt{6}\}$

*b. $\left\{-1 + \frac{\sqrt{6}}{3},\ -1 - \frac{\sqrt{6}}{3}\right\}$

c. $\{3 + \sqrt{3},\ 3 - \sqrt{3}\}$

d. $\left\{3 + \frac{\sqrt{26}}{3},\ 3 - \frac{\sqrt{26}}{3}\right\}$

What is the correct procedure for completing the **square** in the equation $2x^2 + 8x + 1 = 0$ 4200205

a. $2\,(x^2 + 4x + 4) = 1 + 8$

$2(x + 2)^2 = 9$

$(x + 2)^2 = \frac{9}{2}$

$x = \pm \frac{3\sqrt{2}}{2} - 2$

*b. $x^2 + 4x = -\frac{1}{2}$

$(x + 2)^2 = \frac{7}{2}$

$x + 2 = \pm\frac{\sqrt{14}}{2}$

$x = \pm \frac{\sqrt{14}}{2} - 2$

c. $2(x^2 + 4x + 4) = -1 + 8$

$(x + 2)^2 = 7$

$(x + 2) = \pm\sqrt{7}$

$x = \pm\sqrt{7} - 2$

d. $x^2 + 4x = \frac{1}{2}$

$x^2 + 4x + 16 = -\frac{1}{2} + 4$

$(x + 2)^2 = \frac{7}{2}$

$x + 2 = \pm\frac{\sqrt{14}}{2}$

$x = \pm \frac{\sqrt{14}}{2} - 2$

THE STUDENT CAN ANALYZE THE SOLUTION OF A QUADRATIC EQUATION BY COMPLETING THE SQAURE BY CHOOSING THE STEP CONTAINING THE ERROR. (4) 0251

Consider the following:

$$2x^2 - 3x + 8 = 0$$

(1) $x^2 - \frac{3}{2x} + 4 = 0$

(2) $x^2 - \frac{3}{2}x = -4$

(3) $x^2 - \frac{3}{2}x + \frac{9}{16} = -4 + \frac{9}{16}$

(4) $(x - \frac{3}{4})^2 = \frac{-55}{9}$

(5) $x - \frac{3}{4} = \frac{\pm\sqrt{-55}}{3}$

(6) $x = \frac{3}{4} \pm \frac{\sqrt{-55}}{3}$

The error in the above work, if one exists, occurs in 4201246

a. 1
b. 3
* c. 4
d. 5
e. none of the above; there is no error

Consider the following: $3x^2 + 15x + 9 = 33$

(1) $x^2 + 5x + 3 = 11$

(2) $x^2 + 5x = 8$

(3) $x^2 + 5x + \frac{25}{4} = 8 + \frac{25}{4}$

(4) $(x + \frac{25}{4})^2 = \frac{57}{4}$

(5) $x + \frac{25}{4} = \frac{\pm\sqrt{57}}{2}$

(6) $x = \frac{-26}{4} \pm\sqrt{\frac{57}{2}}$

The error in the above work, if one exists, occurs in 4201247

a. 1
b. 3
*c. 4
d. 5
e. none of the above; there is no error

Consider the following: $x^2 + 4x + 8 = 29$

(1) $x^2 + 4x = 21$

(2) $x^2 + 4x + 4 = 25$

(3) $(x + 2)^2 = 25$

(4) $x + 2 = 5$

(5) $x = 3$

The error in the above work, if one exists, occurs in 4201248

a. 2
b. 3
*c. 4
d. 5
e. none of the above; there is no error

Consider the following: $4x^2 + 6x + 11 = 51$

(1) $4x^2 + 6x = 40$

(2) $4x^2 + 6x + 9 = 40 + 9$

(3) $(2x + 3)^2 = 49$

(4) $2x + 3 = \pm 7$

(5) $2x = \pm 7 - 3$

(6) $x = \frac{1}{2}(\pm 7 - 3)$

(7) $x = \{2, -5\}$

The error in the above work, if one exists, occurs in 4201249

*a. 1
b. 3
c. 6
d. 7
e. none of the above; there is no error

THE STUDENT CAN DEMONSTRATE HIS COMPREHENSION OF SOLVING A QUADRATIC EQUATION USING *COMPLETING THE SQUARE* BY JUSTIFYING EACH STEP IN A SEQUENCE OF QUESTIONS WHICH ARE NECESSARY TO SOLVE THE EQUATION BY THIS METHOD. (9) 0383

Directions: In questions 1 - 4, select from the list below the best reason for rewriting the equation in the process of solving by "completing the square".

a. Distributive property.
b. Additive property of equality.
c. Division property of equality.
d. Like roots of equals are equal.
e. Substitution.

C 1. $2x^2 - x - 2 = 0$ is rewritten as $x^2 - 1/2\ x - 1 = 0$ 1514

B 2. Then $x^2 - 1/2\ x - 1 = 0$ is rewritten as $x^2 - 1/2\ x = 1$. 1515

B 3. Then $x^2 - 1/2\ x = 1$ is rewritten as $x^2 - 1/2\ x + 1/16 = 1 + 1/16$ 1516

E 4. Then $x^2 - 1/2x + 1/16 = 1 + 1/16$ is rewritten as $x^2 - 1/2\ x + 1/16 = 17/16$. 1517

Directions: Questions 5 - 9, select from the list below the best reason for writing the continuation of the process of solving a quadratic equation by "completing the square".

a. Combining fractions with like denominators.
b. Addition property of equality.
c. Like roots of equals are equal.
d. Distributive property.
e. Meaning of composite sign.

D 5. Then $x^2 - 1/2\ x + 1/16 = 17/16$ is written as $(x - 1/4)^2 = 17/16$ 1518

C 6. Then $(x - 1/4)^2 = 17/16$ is written as $(x - 1/4) = \pm\ \overline{17/4}$. 1519

E 7. Then $(x - 1/4) = \pm\sqrt{17/4}$ is written as $x - 1/4 = \sqrt{17/4}$ and $x - 1/4 = -\sqrt{17/4}$ 1520

B 8. Then $x - 1/4 = \sqrt{17/4}$ is written as $x = 1/4 + \sqrt{17/4}$ and $x - 1/4 = -\sqrt{17/4}$ is written as $x = 1/4 - \sqrt{17/4}$. 1521

A 9. Finally $x = 1/4 + \sqrt{17/4}$ is written as $x = \frac{1 + \sqrt{17}}{4}$ and $x = 1/4 - \sqrt{17/4}$ is written as $x = \frac{1 - \sqrt{17}}{4}$ 1522

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE QUADRATIC EQUATIONS USING THE QUADRATIC FORMULA BY CHOOSING THE CORRECT SOLUTION FOR EACH EQUATION. (6) 0089

Solve for y by using the quadratic formula $y^2 + 7y + 2 = 0$ 4200206

a. $\left\{7 \pm \sqrt{8}\right\}$

b. $\left\{\frac{\pm \sqrt{46}}{6}\right\}$

c. $\left\{\frac{\pm \sqrt{57}}{2}\right\}$

*d. $\left\{\frac{-7 \pm \sqrt{41}}{2}\right\}$

Solve for x using the quadratic formula $x^2 - 5x - 15 = 0$ 4200207

a. $x = \left\{0, 5\right\}$

b. $x = \left\{\frac{5 \pm \sqrt{35}}{2}\right\}$

*c. $x = \left\{\frac{5 \pm \sqrt{85}}{2}\right\}$

d. $x = \left\{\pm \frac{\sqrt{85}}{2}\right\}$

Solve for x using the quadratic formula $3x^2 + 5x + 1 = 0$ 4200208

*a. $x = \left\{\frac{-5 \pm \sqrt{13}}{6}\right\}$

b. $x = \left\{\frac{-5 \pm \sqrt{37}}{6}\right\}$

c. $x = \left\{\frac{-5 \pm 3\sqrt{2}}{6}\right\}$

d. $x = \left\{\frac{5 \pm \sqrt{13}}{2}\right\}$

Solve for x using the quadratic formula $x^2 + 6x = 5$ 4200209

a. $x = \left\{-2, -4\right\}$

b. $x = \left\{\frac{-5 \pm \sqrt{5}}{2}\right\}$

c. $\frac{-1 \pm \sqrt{14}}{6}$

*d. $x = \left\{-3 \pm \sqrt{14}\right\}$

Solve for x using the quadratic formula $x^2 = 3x + 1$ 4200210

*a. $x = \left\{\frac{3 \pm \sqrt{13}}{2}\right\}$

b. $x = \left\{\frac{-3 + \sqrt{5}}{2}\right\}$

c. $x = \frac{-3 \pm \sqrt{2}}{2}$

d. $x = \left\{\frac{3 \pm \sqrt{7}}{6}\right\}$

The correct procedure for solving the equation $3x^2 + 4x + 6 = 0$ using the quadratic formula is 4200211

a. $x = \frac{-4 \pm \sqrt{36 - 48}}{6}$

b. $x = \frac{-3 \pm \sqrt{16 - 72}}{12}$

*c. $x = \frac{-4 \pm \sqrt{16 - 72}}{6}$

d. $x = \frac{-6 \pm \sqrt{9 - 96}}{12}$

THE STUDENT CAN APPLY THE QUADRATIC FORMULA TO SOLVING QUADRATIC EQUATIONS WHICH HAVE COMPLEX NUMBERS AS ROOTS BY SHOWING THE ROOTS AFTER SOLUTION AS COMPLEX NUMBERS IN STANDARD FORM. (1) 0397

1. Solve $2X^2 + 2 = 3X$ over the set of complex numbers. 1558

a. $\{2, -1/2\}$

*b. $\{3/4 + \sqrt{7}/4\ i,\ 3/4 - \sqrt{7}/4\ i\}$

c. $\{-3/4 + \sqrt{7}/4\ i,\ -3/4 - \sqrt{7}/4\ i\}$

d. $\{1/2, -2\}$

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE A QUADRATIC EQUATION BY USING THE QUADRATIC FORMULA OR BY COMPLETING THE SQUARE BY CHOOSING THE CORRECT FORM APPEARING IN THE SOLUTION STEPS. (3) 0109

After you use the method of completing the square, the equation $T^2 - 6T - 7 = 0$ is in which of the following forms: 4200279

a. $T^2 - 6T = 7$

*b. $T^2 - 6T + 9 = 16$

c. $T^2 - 6T + 36 = 43$

d. $T\ (T - 6) = 7$

When you use the quadratic formula to solve the equation $T^2 - 6T - 7 = 0$ the discriminate is: 4200280

a. $\sqrt{1 + 178}$

b. $\sqrt{49 + 24}$

*c. $\sqrt{36 + 28}$

d. $\sqrt{36 - 28}$

Solve for K : $K^2 - 6K + 1 = 0$ 4200281

a. $\frac{-1 \pm \sqrt{2}}{2}$

b. $\frac{\sqrt{2} \pm 2}{2}$

c. $\frac{2 \pm \sqrt{6}}{2}$

*d. $3 \pm 2\sqrt{2}$

THE STUDENT SOLVES A QUADRATIC EQUATION USING THE FACTOR PRINCIPLE BY CHOOSING THE CORRECT SOLUTION TO A GIVEN EQUATION. (2) 0243

Use the property "ab = 0 if and only if a = 0 or b = 0" to solve the equation $x^2 - 8x + 15 = 0$. 4201216

*a. (3,5)
b. (-3, -5)
c. (-3, 5)
d. (3, -5)

Use the property "ab = 0 if and only if a = 0 or b = 0" to solve the equation $(2x - 3)(5x + 1) = 0$. 4201217

A. $\left(-\frac{1}{5}, -\frac{3}{2}\right)$

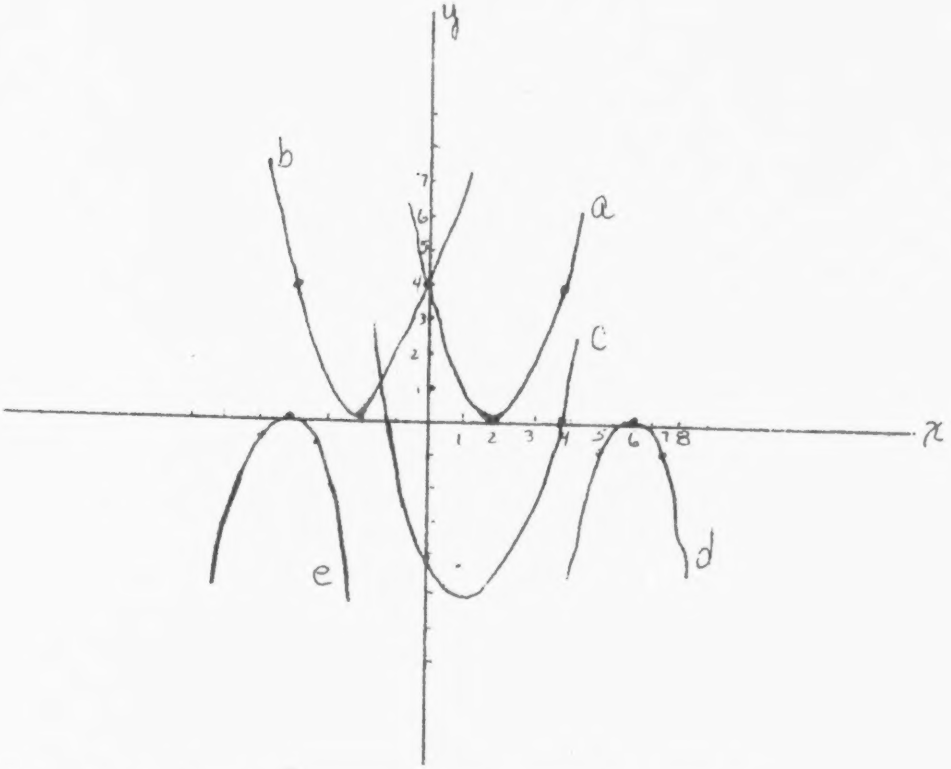
B. $\left(\frac{1}{5}, \frac{-3}{2}\right)$

*C. $\left(\frac{-1}{5}, \frac{3}{2}\right)$

D. $\left(\frac{1}{5}, \frac{3}{2}\right)$

THE STUDENT IS ABLE TO TRANSLATE GIVEN QUADRATIC EQUATIONS INTO THEIR GRAPHS BY IDENTIFYING THE PARABOLA THAT REPRESENTS ITS GRAPH. (4) 0389

Directions: In the following questions identify the given equation with its graph in the drawing below.



1. b The graph of $x^2+4x+4=0$ is the parabola labeled.______ 1534

2. c The graph of $x^2-3x-4=0$ is the parabola labeled ______. 1535

3. a The graph of $x^2-4x+4=0$ is the parabola labeled______. 1536

4. e The graph of $-(x+4)^2=0$ is the parabola labeled______. 1537

GIVEN THE PRODUCT OF THE ROOTS OR THE SUM OF THE ROOTS AND ONE ROOT OF ANY QUADRATIC EQUATION THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE OTHER ROOT OF THE QUADRATIC EQUATION OR THE QUADRATIC EQUATION ITSELF BY CHOOSING THE CORRECT REMAINING ROOT. (3) 0111

1. Knowing that any quadratic equation can be written in the form $(x - r_1)(x - r_2) = 0$ where r_1 and r_2 are roots of the equation,
2. also that the general form of any quadratic equation is $ax^2 + bx + c = 0$ or $x^2 + \frac{b}{a}x + \frac{c}{a} = 0$
3. and that $r_1 + r_2 = -\frac{b}{a}$ and $r_1 r_2 = \frac{c}{a}$

The sum of the roots of a quadratic equation is 10 and one root is 2, what is the other root of the quadratic equation? 4200284

a. 5
b. -12
c. -5
*d. 8

Given that the product of the roots of a quadratic equation is 12 and one root is -4, what is the quadratic equation? 4200285

a. $r^2 - 7r + 12 = 0$

b. $r^2 - 12r - 64 = 0$

*c. $r^2 + 7r + 12 = 0$

d. $r^2 - 12r + 32 = 0$

What is the other root of the quadratic equation given the quadratic equation $x^2 - 5x \mp 6 = 0$ and 6 as one root of the equation? 4200286

*a. -1
b. -11
c. $\frac{5}{6}$
d. 11

BY EXAMINING THE DISCRIMINANT OF A QUADRATIC FUNCTION THE STUDENT DEMONSTRATES HIS ABILITY TO TELL WHETHER THE QUADRATIC FUNCTION HAS TWO DIFFERENT REAL ROOTS, A DOUBLE REAL ROOT, OR NO REAL ROOTS, BY CHOOSING THE CORRECT NATURE OF THE ROOTS. (3) 0112

What are the nature of the roots of the quadratic equation given $x = \frac{-6 \pm \sqrt{6^2 - 24}}{8}$? 4200287

a. no real roots
*b. two real, different roots
c. a double real root

What are the nature of the roots of the quadratic equation given $x = \frac{-8 \pm \sqrt{(8)^2 - 4 \cdot 16}}{2}$? 4200288

*a. a double real root
b. no real root
c. two real, different roots

What are the nature of the roots of the quadratic equation given $x = \frac{4 \pm \sqrt{(-4)^2 - 4 \cdot 2)}}{2}$? 4200289

*a. two real different roots
b. no real roots
c. a double real root

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF THE RELATIONSHIP BETWEEN THE ROOTS AND THE COEFFICIENTS OF A QUADRATIC EQUATION BY CALCULATING ONE, GIVEN THE OTHER. (2) 0283

If a and b are integers and roots of a quadratic equation in x, then the coefficient of the x term is________. 4201362

*a. $-(a + b)$

b. $a \cdot b$

c. $-ab$

d. $(a + b)$

If $\{8, -5\}$ is the solution set of a quadratic equation in x, then in the form $ax^2 + bx + c = 0$, $c =$ ________. 4201363

a. +3

*b. -40

c. +40

d. -3

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF THE RELATIONSHIP BETWEEN THE ROOTS OF A QUADRATIC EQUATION AND ITS GRAPH BY USE OF THE DISCRIMINANT BY SELECTING CORRECT STATEMENTS ABOUT ROOTS FOR VARIOUS DISCRIMINANTS. (8) 0310

Instructions: Consider: $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ as the formula for finding the roots of the equation. The following items are a set showing relationship between roots and discriminant of a quadratic.

What part of the formula determines whether there will be none, one or more roots? 4200493

a. $-b$

b. $\pm \sqrt{}$

*c. $b^2 - 4ac$

d. $\frac{-b}{2a}$

e. none of these

f. all of these

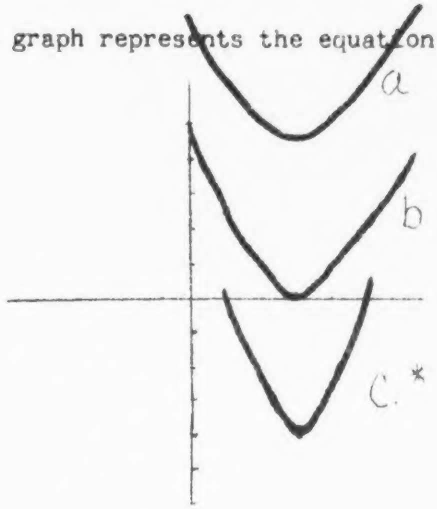
In the following equation there will be how many roots? 4200494

$$2x^2 - 9x - 35 = 0$$

$$x = \frac{9 \pm \sqrt{81 - 4\cdot 2(-35)}}{2\cdot 2}$$

a. none
b. one
*c. two

Which graph represents the equation f:x $x^2 - 6x + 5$ 4200495



Match items of column 1 with one of the items of column 2.

	I	II	
b	the roots are equal	a. $b^2 - 4ac < 0$	4200496
c	the graph will intersect the the x-axis in two real points	b. $b^2 - 4ac = 0$	4200497
a	the roots are imaginary	c. $b^2 - 4ac > 0$	4200498
b	the graph has its vertex on x-axis		4200499
a	the graph does not touch or cross x-axis		4200500

THE STUDENT CAN FIND SOLUTIONS TO PROBLEMS BASED ON KNOWLEDGE OF FACTORING AND THE NATURE OF ROOTS OF QUADRATIC EQUATIONS BY SELECTING CORRECT DESCRIPTIONS OF COEFFICIENTS. (9) 0321

1. Given: $a^2 + b^2 = 6$
$ab = 5$

Find: $(a + b)$ 859

a. ± 2

*b. ± 4

c. ± 1

d. no solution

2. In order that the quadratic equation $x^2 + 8x + k = 0$ have equal roots, k must be 860

a. +64

b. -64

*c. +16

d. -16

3. In order that one root of the quadratic equation $x^2 + 6x + k = 0$ be zero, k must be 861

a. 9

b. 8

c. -7

*d. none of these

4. In order that the roots of the quadratic equation $x^2 + 6x + k = 0$ have the same absolute value but different signs, k must be 862

a. positive
b. negative
c. positive 9
d. negative 9
*e. none of these

5. In order that the roots of the quadratic equation $x^2 - 8x + k = 0$ be unequal and positive, k must be 863

a. positive and even
*b. positive and odd
c. negative and even
d. negative and odd
e. positive
f. negative

6. In order that one root be positive and one root negative for the quadratic equation $x^2 - x + k = 0$, k must be 864

a. positive
*b. negative
c. zero
d. none of these

7. In order that the roots of the quadratic equation $x^2 + kx - 4 = 0$ be numerically equal but different in sign, k must be 865

a. positive
b. negative
*c. zero
d. none of these

8. In the quadratic equation $x^2 + kx - 12 = 0$, k may have the following integral values in order to solve the equation by factoring. 866

*a. +1, +4, +11, -1, -4, -11

b. 0, +1, +4, -1, -4, -11

c. +1, +2, +11, -1, -2, -11

d. +1, +4, +12, -1, -4, -12

9. Given: $a^2 + b^2 = 25$
$2ab = 9$

Find: $(a - b)$ 867

*a. ± 4

b. ± 1

c. ± 3

d. ± 5

THE STUDENT CAN TRANSLATE A GIVEN SET OF ROOTS INTO THE EQUATION WHICH PRODUCED THEM BY USING THE PROPERTY OF THE SUM AND PRODUCT OF THE ROOTS OF A QUADRATIC. (2) 0381

1. Write a quadratic equation in simple form having the solution set $\{-4, 7\}$. 1570

a. $X^2 + 3x - 28 = 0$

b. $X^2 - 3x + 28 = 0$

*c. $X^2 - 3x - 28 = 0$

d. $X^2 - 28x + 3 = 0$

e. $X^2 + 28x - 3 = 0$

2. Write a quadratic equation in simple form having the solution set $\{1 - \sqrt{7}, 1 + \sqrt{7}\}$. 1511

*a. $X^2 - 2x - 6 = 0$

b. $X^2 + 2x - 6 = 0$

c. $X^2 + 2x + 6 = 0$

d. $X^2 + 6x - 2 = 0$

e. $X^2 - 6x + 2 = 0$

THE STUDENT IS ABLE TO APPLY THE QUADRATIC FORMULA IN SOLVING A QUADRATIC WHICH IS NOT IN STANDARD FORM BY IDENTIFYING THE ROOTS IN A GIVEN LIST. (2) 0382

1. Solve the equation $2x^2 + 3x = 5$ in real numbers by using the quadratic formula. 1512

a. $\{-1, 5/2\}$

*b. $\{+1, -5/2\}$

c. $\emptyset$

d. $\{-4, 10\}$

2. Solve the equation $3y^2 = 3 - 4y$ in real numbers by using the quadratic formula. 1513

*a. $\left\{\frac{-2 + \sqrt{13}}{3}, \frac{-2 - \sqrt{13}}{3}\right\}$

b. $\left\{\frac{-2 + 2\sqrt{13}}{3}, \frac{-2 \ -2\sqrt{13}}{3}\right\}$

c. $\left\{\frac{2 + \sqrt{13}}{3}, \frac{2 - \sqrt{13}}{3}\right\}$

d. $\emptyset$

THE STUDENT CAN INTERPRET THE NATURE OF THE ROOTS OF QUADRATIC EQUATIONS HAVING EVALUATED THE DISCRIMINANT OF EACH EQUATION BY DESCRIBING THE ROOTS. (4) 0386

Directions: In the following questions identify from the list below the description which best fits the given equation.

a. Two different real rational roots
b. Two different real irrational roots
c. Two equal real rational roots
d. Two equal real irrational roots
e. No real roots

_e_ 1. Without solving the equation, $y^2 + 3y - 10 = 0$ determine the nature of its roots. 1527

_a_ 2. Without solving the equation, $x^2 - 5x = 14$ determine the nature of its roots. 1528

_c_ 3. Without solving the equation, $3x^2 - 18x + 27 = 0$ determine the nature of its roots. 1529

_b_ 4. Without solving the equation $x^2 - 2x - 1 = 0$ determine the nature of its roots. 1530

THE STUDENT CAN ANALYZE AN EQUATION WHICH DOES NOT ORIGINALLY DISCLOSE THE NEED FOR SOLVING A QUADRATIC EQUATION BY FINDING THE REAL ROOTS IN SIMPLE RADICAL FORM IN THE GIVEN EXERCISE. (1) 0388

1. Solve the equation $\frac{1}{x+2} + \frac{1}{x+6} = 1$ in real numbers. 1533

*a. $\{-3+\sqrt{5},\ -3-\sqrt{5}\}$

b. $\{3-\sqrt{5},\ 3-\sqrt{5}\}$

c. $\{-3+2\sqrt{5},\ -3-2\sqrt{5}\}$

d. $\{3+2\sqrt{5},\ 3-2\sqrt{5}\}$

e. $\emptyset$

THE STUDENT WILL BE ABLE TO SHOW HIS UNDERSTANDING OF THE POSSIBLE KINDS OF ROOTS OF QUADRATIC EQUATIONS BY FINDING VALUES THAT WILL MAKE THE ROOTS REAL, EQUAL OR IMAGINARY. (2) 0516

1. The values of k so that the roots of $x^2+2x+k+3=0$ will be equal is 1910

a. 4
*b. -2
c. 1
d. 2

2. The values of c so that the roots of $y^2+cy+(5-2c)=0$ will be imaginary are: 1911

*a.. $-10<c<2$

b. $c=2$ or $c=-10$

c. $c>2$ or $c<-10$

d. $c>2$ and $c<-10$

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF THE RELATIONSHIP BETWEEN THE ROOTS OF A QUADRATIC EQUATION AND THE COEFFICIENTS BY SELECTING MAXIMA, MINIMA AND INTERCEPTS. (5) 0309

Taking the general quadratic equation $ax^2 + bx + c = 0$ and its two roots $r_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$ and $r_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$ what operation on r_1 and r_2 would be necessary to yield $\frac{-b}{a}$? 4200488

*a. +
b. -
c. x
d.
e. none of these

Using the same information as above, what operation would yield $\frac{c}{a}$? 4200489

a. +
b. -
*c. x
d.
e. none of these

Without knowing the zeros of the equation find $\frac{-b}{a}$ and $\frac{c}{a}$ of $f:x \longrightarrow 3x^2 - 4x + 8$. 4200490

a. $\frac{-4}{3}$, $\frac{8}{3}$
b. $\frac{4}{3}$, $\frac{-8}{3}$
*c. $\frac{4}{3}$, $\frac{8}{3}$
d. $\frac{-4}{3}$, $\frac{-8}{3}$

Find the quadratic equation whose roots are $3 + \sqrt{2}$ and $3 - \sqrt{2}$. 4200491

a. $x^2 + 6x + 5 = 0$

*b. $x^2 - 6x + 7 = 0$

c. $x^2 + 6x + 7 = 0$

d. $x^2 - 6x + 5 = 0$

e. $x^2 - 6x - 7 = 0$

Without solving, form a quadratic equation whose roots are squares of the roots of $2x^2 + x - 6 = 0$. 4200492

a. $4x^2 - 25x + 9 = 0$

b. $4x^2 - x + 36 = 0$

c. $4x^2 - x + 9 = 0$

*d. $4x^2 - 25x + 36 = 0$

e. none of these

THE STUDENT DEMONSTRATES HIS ABILITY TO FIND RATIONAL ROOTS OF A POLYNOMIAL EQUATION BY CHOOSING THE CORRECT SOLUTION FOR A GIVEN EQUATION. (3) 0104

What are the rational roots of the equation $y^3 - 6y^2 + 11y - 6 = 0$? 4200263

a. $\{-1, -2, 6\}$
b. $\{-6, 1, -3\}$
*c. $\{1, 2, 3\}$
d. $\{2, -2, 3\}$

Find the rational root of $\frac{3}{2}T^3 - T^2 + T + \frac{1}{2} = 0$. 4200264

a. $\{-1, 1\}$

*b. $\left\{\frac{-1}{3}\right\}$

c. $\left\{\frac{-1}{3}\right\}$

d. $\{-1\}$

Find the rational roots of $T^3 + T^2 - \frac{T}{4} - \frac{1}{4} = 0$ given one root of $T = -1$. 4200265

a. $\left\{-\frac{1}{4}, 1\right\}$

*b. $\left\{-\frac{1}{2}, \frac{1}{2}\right\}$

c. $\left\{\frac{1}{4}, -\frac{1}{2}\right\}$

d. $\left\{\frac{1}{2}, 1\right\}$

THE STUDENT DEMONSTRATES HIS ABILITY TO USE DEPRESSED EQUATIONS OR REDUCED EQUATIONS TO FIND ALL THE ROOTS OF A POLYNOMIAL EQUATION BY CHOOSING THE CORRECT ZEROES OF A GIVEN FUNCTION. (3) 0154

Find all the rational zeros of the polynomial function $2x^3 - x^2 - 2x + 1$. 4200432

a. -1, 2, 3

b. $-\frac{1}{2}$, 0, 2

*c. -1, $\frac{1}{2}$, 1

d. 1, 2, 3

Find all the zeros of the function $f(x) = 2x^4 + 7x^3 + 4x^2 - 7x - 6$. 4200433

a. $\frac{1}{2}$, $\frac{3}{2}$, 6, -6

*b. -2, $-\frac{3}{2}$, -1, 1

c. 3, $\frac{3}{2}$, 6, $\frac{1}{2}$

d. 2, 1, $-\frac{3}{2}$, -6

Find all the zeros of the polynomial function 4200434
$f(x) = x^4 - 5x^3 + 5x^2 + 5x - 6$.

a. -1, 2, 3, -2

b. -2, -6, 3, 1

*c. -1, 1, 2, 3

d. 3, -2, 6, -1

THE STUDENT DISPLAYS HIS ABILITY TO USE DESCARTES RULE OF SIGNS IN DETERMINING THE NUMBER OF POSITIVE OR NEGATIVE ROOTS OF A POLYNOMIAL EQUATION BY CHOOSING THE NUMBER OF ROOTS FOR A GIVEN EQUATION. (3) 0156

According to Descartes' rule of signs what is the largest # of real positive roots possible for the equation ? 4200438
$x^5 + 6x^4 - 3x^3 + 2x + 1 = 0$

a. 3
b. 1
*c. 2
d. 4

How many negative real roots are possible for the equation $x^3 - 2x^2 + x - 1 = 0$? 4200439

a. 1
b. 3
*c. 0
d. 2

How many imaginary roots must the equation 4200440
$4x^5 - x^4 - x^2 - 1 = 0$ have ?

a. 0
*b. 4
c. 2
d. 1

THE STUDENT DISPLAYS HIS ABILITY TO USE THE LOCATION PRINCIPLE IN FINDING THE ZEROS OF A POLYNOMIAL FUNCTION BY CHOOSING THE CORRECT ZEROS FOR GIVEN EQUATIONS. (3) 0157

Use the Location principle to locate the zeros of $f\ (x) = 2x^3 - x^2 - 2x + 6$ 4200441

a. between 1 and 2
b. between 0 and 1
*c. between -1, and -2
d. between -1 and 0

The polynomial function $f\ (x) = 12x^3 - 8x^2 - 21x + 14$ has three real zeros, locate each of them between two consecutive integers. 4200442

a. between 0 and 1
between 0 and - 1
between 1 and

b. between -1 and -2
between 2 and 3
between 0 and 1

c. between 0 and 1
between -2 and -3
between 1 and 2

*d. between 0 and 1
between -2 and -1
between 1 and 2

The polynomial function $f\ (x) = 2x^3 - 5x^2 - x + 5$ locate the zeros between consecutive integers. 4200443

*a. between 0 and -1
between 1 and 2
between 2 and 3

b. between -1 and -2
between 1 and 2
between 0 and -1

c. between -1 and -2
between 0 and 1
between -2 and -3

d. between 2 and 1
between 3 and 4
between -1 and -2

THE STUDENT DEMONSTRATES HIS ABILITY TO FIND AN UPPER AND LOWER BOUND FOR A POLYNOMIAL EQUATION BY CHOOSING THE CORRECT UPPER AND LOWER BOUND FOR A GIVEN EQUATION. (3) 0158

Find the smallest nonnegative integral upperbound and the greatest non-positive integral lower bound for the polynomial equation $2x^3 - 7x^2 - 4 = 0$. 4200444

a. upper bound 2
lower bound -1

*b. upper bound 4
lower bound 0

c. upper bound 3
lower bound -2

d. upper bound 5
lower bound -2

Find the smallest non-negative integral upperbound and the greatest non-positive integral lower bound for the polynomial equation $x^4 + 3x^3 + 4x^2 - 36 = 0$. 4200445

a. upper bound 3
lower bound -2

b. upper bound 5
lower bound 0

*c. upper bound 2
lower bound -3

d. upper bound 1
lower bound -1

Find the smallest nonnegative integral upper bound and the greatest non-positive integral lower bound for the polynomial equation $x^5 - x^4 + 2x^3 - 3 = 0$ 4200446

*a. upper bound 2
lower bound -1

b. upper bound 4
lower bound - 3

c. upper bound 5
lower bound -1

d. upper bound 2
lower bound -4

THE STUDENT CAN SHOW UNDERSTANDING OF THE THEOREM ABOUT RATIONAL ROOTS OF A POLYNOMIAL EQUATION IN SIMPLE FORM BY SELECTING THE RATIONAL NUMBER POSSIBILITIES FOR ROOTS OF A POLYNOMIAL EQUATION.(2) 0378

1. Name the rational number possibilities of the polynomial equation, $7X^4 - 3X^2 + 4X - 4 = 0$. 1504

a. 1, 1/7, 2, 2/7, 4, 4/7

*b. $\pm$ 1, $\pm$ 1/7, $\pm$ 2, $\pm$2/7, $\pm$4, $\pm$ 4/7

c. $\pm$ 1, $\pm$ 7, $\pm\frac{1}{2}$, $\pm$ 7/2, $\pm$ $\frac{1}{4}$, $\pm$ 7/4

d. $\pm$ 1/7, $\pm$ 2, $\pm$ 2/7, $\pm$ 4, $\pm$ 4/7

Find the rational roots of the equation, $x^3 - 6X^2 + 11X - 6 = 0$. 1505

a. $\{-1, 2, 3\}$

b. $\{1, 2, 3, 6\}$

*c. $\{1, 2, 3\}$

d. $\emptyset$

e. $\{-1, -2, -3\}$

THE STUDENT CAN DEMONSTRATE COMPREHENSION OF THE NUMBER AND NATURE OF REAL ROOTS OF AN EQUATION OF HIGHER DEGREE BY SELECTING THE ROOT(S) OF AN EQUATION IN REAL NUMBERS. (2) 0380

1. Solve the equation, $49X^2 = 64$, in the real numbers. 1508

a. $7X = \pm 8$

b. $X = + 8/7$

c. $X = - 8/7$

*d. $X = \pm 8/7$

e. $X = \emptyset$

2. Solve the equation, $8r^3 + 125 = 0$ in the real numbers. 1509

a. $r = \pm 5/2$

*b. $r = - 5/2$

c. $r = 5/2$

d. $8r = -5$

e. $r = \emptyset$

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO ANALYZE GIVEN INFORMATION ABOUT ROOTS OF POLYNOMIAL EQUATIONS BY DISCOVERING A PATTERN WHEREBY HE CAN FORMULATE A GENERAL RULE. (1) 0515

Directions: Study the information below and then answer the following questions. 1909

1) 2 and 3 are roots of the equation $x^2 - 5x + 6 = 0$

2) 2, 3 and -1 are roots of the equation $x^3 -4x^2+ x + 6 = 0$

3) 2, 3, -2 and -5 are roots of the equation $x^4 + 2x^3 - 19x^2 - 8x + 60 = 0$

1. If r_1 r_2, r_3 ....r_n are roots of a polynomial equation of degree n with one the coefficient of x^n , then the numerical coeffieient of x^{n-2} can be expressed as:

a. $-(r_1 \ r_2, \ r_3 + \ldots r_n)$

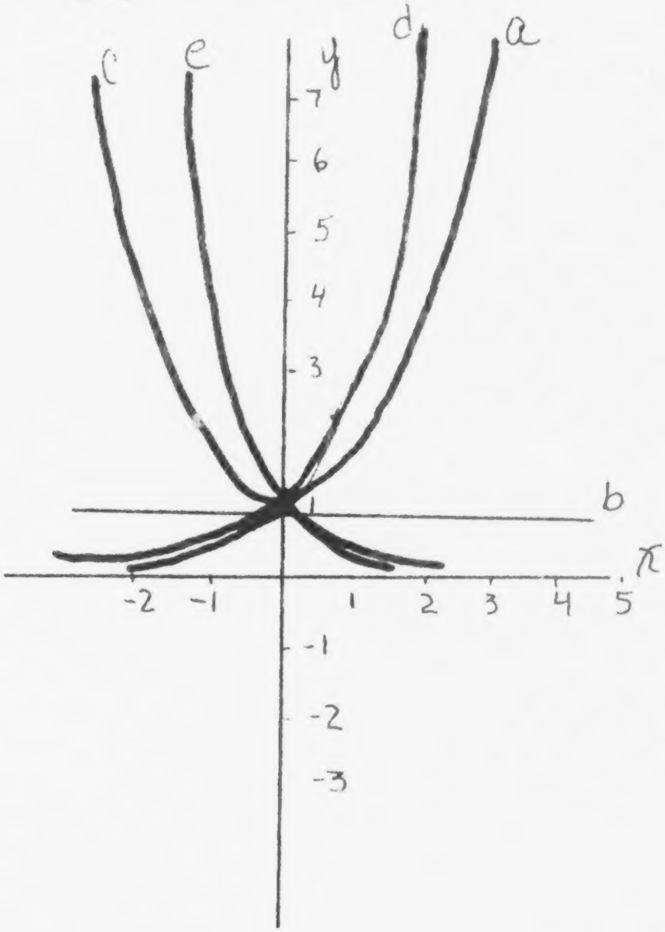
b. $(r_1 + r_2 + r_3 + \ldots r_n)$

c. $-(r_1, \ r_2 + r, \ r_3 + \ldots r, \ r_n + \ldots r_{n-1} \ r_n)$

*d. $(r_1 \ r_2 + r_1 \ r_3 + \ldots r_1 \ r_n + \ldots r_{n-1} \ r_n)$

THE STUDENT IS ABLE TO TRANSLATE GIVEN EXPONENTIAL EQUATIONS INTO THEIR GRAPHS BY IDENTIFYING THE EXPONENTIAL EQUATION THAT IS REPRESENTED BY THE GRAPH. (4) 0419

Directions: In the following questions, identify the given equation with its graph in the drawing below.



c 1. The graph of $y = (1/2)^x$ is labeled__________. 1632

d 2. The graph of $y = 4^x$ is labeled__________. 1633

b 3. The graph of $y = 1^x$ is labeled__________. 1634

a 4. The graph of $y = 2^x$ is labeled__________. 1635

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO EVALUATE THE SCIENTIFIC SOUNDNESS OF STATEMENTS ABOUT CHANGE BY INDICATING EACH STATEMENTS DEGREE OF SCIENTIFIC ACCURACY. (6) 0433

Directions: For the following express your evaluation of the statement by choosing the corresponding number of the correct stage.

a. belief stage
b. authoritative opinion stage
c. observation stage
d. predicting stage
e. controlled experiment stage

e 1. Rocks wear away at a faster rate in the presence of water. 1682

c 2. The time and location of earthquakes. 1683

d 3. The number of sun spots next year. 1684

b 4. The origin of the Rocky Mts. 1685

a 5. Change occurs constantly. 1686

b 6. The age of the earth. 1687

THE STUDENT DISPLAYS HIS UNDERSTANDING OF THE AXIS OF SYMMETRY BY CHOOSING THE CORRECT AXIS EQUATION FOR A GIVEN QUADRATIC EQUATION. (3) 0101

What is the equation of the axis of symmetry for the quadratic equation $y = -2x^2$? 420025

a. $y = 0$
b. $x = -2$
*c. $x = 0$
d. $y = -2$

What is the equation of the axis of symmetry for the equation $y = x^2 + 2x + 8$? 4200252

*a. x = -1
b. x = 7
c. x = -2
d. x = 4

What is the equation of the axis of symmetry for the equation $y = 2(x-1)^2 + 3$? 4200253

a. x = 0
b. x = 2
c. x = 3
*d. x = 1

THE STUDENT DISPLAYS HIS ABILITY TO FIND THE VERTEX OF CERTAIN EQUATIONS BY CHOOSING THE CORRECT VERTEX FOR A GIVEN EQUATION. (4) 0102

What is the vertex of the graph of the equation $x = -3y^2$? 4200254

a. (-3, 0)
b. (0, -3)
*c. (0. 0)
d. (-3. 2)

What is the vertex of the graph of the equation $y = x^2 + 6x + 7$? 4200255

a. (2, 1)
b. (-2, 4)
c. (-1, -7)
*d. (-3, -2)

What is the vertex of the graph of the equation $x = (y - 2)^2$? 4200256

*a. (0, 2)
b. (0, 0)
c. (-2, 0)
d. (2, 0)

What is the vertex of the graph of the equation $y = 2x^2 + 8x + 1$? 4200257

a. (3, 4)

b. (0, 4)

*c. (-2, -7)

d. (-5, -2)

THE STUDENT DEMONSTRATES HIS ABILITY TO APPLY THE ADDITION AND SUBTRACTION METHOD OF SOLVING SIMULTANEOUS EQUATIONS BY CHOOSING THE CORRECT SOLUTION FOR EACH SET OF EQUATIONS. (3) 0071

Given the two equations $2x + 2y = 10$ and $x - 2y = -4$ which response would yield the correct solution for both equations? 4200138

*a.

$$\begin{array}{l} 2x + 2y = 10 \\ \underline{\;\; x - 2y = -4} \\ 3x = 6 \\ \;\; x = 2 \\ \;\; y = 3 \end{array}$$

b.

$$\begin{array}{l} 2x + 2y = 10 \\ \underline{\;\; x - 2y = -4} \\ \;\; x = 6 \\ \;\; y = 1 \end{array}$$

c.

$$\begin{array}{l} 2x + 2y = 10 \\ \underline{\;\; x - 2y = -4} \\ 4y = 14 \\ \;\; y = \frac{7}{2} \\ \;\; x = \frac{3}{2} \end{array}$$

d.

$$\begin{array}{l} 2x + 2y = 10 \\ \underline{\;\; x - 2y = -4} \\ 3x = 14 \\ \;\; x = \frac{14}{3} \\ \;\; y = \frac{13}{3} \end{array}$$

Given $x + y = 9$ and $3x + y = 19$ which response would yield the correct solution for x and for y in both equations? 4200139

a.
$$\begin{array}{l} x + y = 9 \\ \underline{3x + y = 19} \\ 4x = 28 \\ x = 7 \\ y = 2 \end{array}$$

b.
$$\begin{array}{l} x + y = 9 \\ \underline{3x + y = 19} \\ 2y = 28 \\ y = 14 \\ x = -5 \end{array}$$

*c.
$$\begin{array}{l} x + y = 9 \\ \underline{3x + y = 19} \\ -2x = -10 \\ x = 5 \\ y = 4 \end{array}$$

d.
$$\begin{array}{l} x + y = 9 \\ \underline{3x + y = 19} \\ 2x = 28 \\ x = 14 \\ y = -5 \end{array}$$

Given $3x = y + 6$ and $x = y + 2$ which response would yield the correct solution for x and for y in both equations? 4200140

a.
$$\begin{array}{l} 3x = y + 6 \\ \underline{x = y + 2} \\ 4x = 4 \\ x = 1 \\ y = -1 \end{array}$$

b.
$$\begin{array}{l} 3x = y + 6 \\ \underline{x = y + 2} \\ 0 = 2y + 8 \\ 2 = y \\ 4 = x \end{array}$$

c.
$$\begin{array}{l} 3x = y + 6 \\ \underline{x = y + 2} \\ 0 = y + 8 \\ -8 = y \\ 6 = x \end{array}$$

*d.
$$\begin{array}{l} 3x = y + 6 \\ \underline{x = y + 2} \\ 2x = 4 \\ x = 2 \\ y = 0 \end{array}$$

THE STUDENT DEMONSTRATES HIS ABILITY TO USE THE MULTIPLICATION METHOD IN SOLVING SIMULTANEOUS EQUATIONS BY CHOOSING THE CORRECT PROCEDURE FOR A GIVEN PAIR OF EQUATIONS. (2) 0072

Given two equations, $w + z = 10$ and $2w + 3z = 23$ which procedure would yield the correct response? 4200141

a.
$$\begin{array}{c} w + z = 10 \\ \underline{2w + 3z = 23} \\ w = 3 \\ z = 7 \end{array}$$

*b.
$$\begin{array}{c} w + z = 10 \\ \underline{2w + 3z = 23} \\ z = 3 \\ w = 7 \end{array}$$

c.
$$\begin{array}{c} w + z = 10 \\ \underline{2w + 3z = 23} \\ 5w = -105 \\ w = -21 \\ z = 31 \end{array}$$

d.
$$\begin{array}{c} w + z = 10 \\ \underline{2w + 3z = 23} \\ z = 13 \\ w = -3 \end{array}$$

Given the two equations $x + y = 0$ and $5x + y = 12$ which procedure would be the correct solution for x and for y ? 4200142

a.
$$\begin{array}{c} x + y = 0 \\ \underline{5x \quad = 12 - y} \\ 6x \quad = 12 \\ x \quad = -3 \\ y \quad = 3 \end{array}$$

*b.
$$\begin{array}{c} x + y = 0 \\ \underline{5x \quad = 12 - y} \\ y = -3 \\ x = 3 \end{array}$$

c.
$$\begin{array}{c} x + y = 0 \\ \underline{5x \quad = 12 - y} \\ 2y = 12 \\ y = 6 \\ x = -6 \end{array}$$

d.
$$\begin{array}{c} x + y = 0 \\ \underline{5\ x \quad = 12 - y} \\ 10x = 120 \\ x = 12 \\ y = -12 \end{array}$$

THE STUDENT DEMONSTRATES HIS ABILITY TO USE THE SUBSTITUTION METHOD IN SOLVING LINEAR EQUATIONS SIMULTANEOUSLY BY CHOOSING THE CORRECT PROCEDURE FOR TWO GIVEN EQUATIONS. (2) 0073

Which of the following procedures would give the correct solution to the equations $x + y = 1$ and $x = 2y + 7$? 4200143

a.
$$\begin{array}{l} x + y = 1 \\ \underline{x = 2y + 7} \\ 2y + y = 1 \\ 3y = 1 \\ y = 1/3 \\ x = 2/3 \end{array}$$

b.
$$\begin{array}{l} x + y = 1 \\ \underline{x = 2y + 7} \\ x = 2x - 1 + 7 \\ x = 3 \\ y = -2 \end{array}$$

*c.
$$\begin{array}{l} 2y + 7 = x \\ \underline{y + x = 1} \\ 2y + 7 + y = 1 \\ 3y = -6 \\ y = -2 \\ x = 3 \end{array}$$

d.
$$\begin{array}{l} x + y = 1 \\ \underline{x = 2y + 7} \\ x + x - 1 = 7 \\ 2x - 1 = 7 \\ 2x = 8 \\ x = 4 \\ y = -3 \end{array}$$

Given the two equations $x - y = -2$ and $2x - 3y = -1$ which procedure would give the correct solution? 4200144

a.
$$\begin{array}{l} x - y = -2 \\ \underline{2x - 3y = -1} \\ 2(-y-2) - 3y = -1 \\ -2y - 2 - 3y = -1 \\ -5y = 1 \\ y = -1/5 \\ x = -2\frac{1}{5} \end{array}$$

b.
$$\begin{array}{l} x - y = -2 \\ \underline{2x - 3y = -1} \\ x + x - 2 = -2 \\ 2x = 0 \\ x = 0 \\ y = 2 \end{array}$$

*c.
$$\begin{array}{l} x - y = -2 \\ \underline{2x - 3y = -1} \\ 2y - 4 - 3y = -1 \\ -y = 3 \\ y = -3 \\ x = -5 \end{array}$$

d.
$$\begin{array}{l} x - y = -2 \\ \underline{2x - 3y = -2} \\ x + 1 + 2x = -2 \\ 3x = -3 \\ x = -5 \\ y = -3 \end{array}$$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE THE SOLUTION OF A SYSTEM OF LINEAR EQUATIONS BY SELECTING INCORRECT STEPS OR SOLUTION SETS. (12) 0311

Matching

c the solution set has one element a. inconsistent 4200501

a the solution set is empty b. dependent 4200502

b the solution set has infinitely many numbers c. independent consistent 4200503

a the graphs are parallel 4200504

c the graphs coincide 4200505

b the graphs intersect 4200506

Which of the following steps will lead you to a false conclusion? 4200507

$$\begin{array}{r} x + 2y = 4 \\ \underline{3x - 2y = -12} \end{array}$$

a. $4x = -8$
b. $x = -2$
c. $-2 + 2y = 4$
*d. $2y = 2$
e. $y = 1$
f. $(-2, 1)$

Match the system with its proper solution set.

c $\begin{array}{l} 3x + 4 = 4y \\ \underline{9x + 2y = 9} \end{array}$ a. $\left\{\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)\right\}$ 4200508

a $\begin{array}{l} \sqrt{3}x - y = 1 \\ x - 3\sqrt{3}y = -\sqrt{3} \end{array}$ b. $\left\{\left(-\frac{4}{3}, \frac{5}{3}\right)\right\}$ 4200509

d $\frac{15}{2x} - \frac{16}{3y} = \frac{23}{6}$ c. $\left\{\left(\frac{2}{3}, \frac{3}{2}\right)\right\}$ 4200510

e $\{(x, y) \mid 3x-4y = 7\} \cap \{(x,y) \mid x+y = 7\}$ d. $\{(3, -4)\}$ 4200511

b $\{(x,y) \mid 6x + 9y = 7\} \cap \{(x,y) \mid 3x - 6y + 14 = 0\}$ e. $\{(3,4)\}$ 4200512

THE STUDENT WILL APPLY THE METHODS USED IN THE SOLVING OF SIMULTANEOUS EQUATIONS IN TWO UNKNOWNS TO THE SOLVING OF SIMULTANEOUS EQUATIONS IN THREE UNKNOWNS IN CHOOSING THE CORRECT FIRST STEP IN THE SOLUTION OF A SET OF EQUATIONS. (4) 0312

Instructions; The following items are a set leading from the solution of system of equations in two unknowns to that of three unknowns.

Since solving the system $2x - y = 8$
$\underline{3x + 2y = 12}$

could begin by eliminating y and reducing the system to one equation in one unknown, what could be the first step in the system $2x - y + z = 8$ 4200513
$x + 2y + 3z = 9$
$\underline{4x + y - 2z = 1}$

a. $5x + 5z = 25$
$\underline{2x - 3z = -7}$

*b. $5x + 5z = 25$
$\underline{6x - z = 9}$

c. $6x - z = 9$
$\underline{3x + z = 7}$

d. $3x + z = 7$
$\underline{2x - 3z = -7}$

Since the first step reduced three equations in three unknowns to two equations in two unknowns, what do you think the second step would be? 4200514

a. To eliminate a different variable from the original three equations.
b. To solve for z, the variable we eliminated
*c. To reduce the two equations to one equation in one unknown.

Taking the result from item 1, find the values of the other two unknowns. 4200515

a. $\left\{\left(\frac{16}{9}, \frac{-25}{9}, \frac{5}{3}\right)\right\}$

b. $\left\{\left(\frac{14}{11}, \frac{-35}{11}, \frac{25}{11}\right)\right\}$

*c. $\{(2, -1, 3)\}$

d. $\{(3, -2, -1)\}$

e. $\left\{\left(8/5, \frac{-7}{5}, \frac{17}{5}\right)\right\}$

f. $\{(1, 12, -3)\}$

Solve this system and choose the proper solution set. 4200516

$$\begin{aligned} 2x-y+3z &= 19 \\ 5x-2y+4z &= 33 \\ \underline{3x+3y-z} &\underline{= 2} \end{aligned}$$

a. $\{(x, 2, 3,)\}$

*b. $\{(3, -1, z)\}$

c. $\{(x, -1, 3)\}$

d. $\{(2, y, 4)\}$

e. $\emptyset$

f. None of the above

THE STUDENT CAN APPLY THE METHOD OF SUBSTITUTION IN SOLVING A SYSTEM OF EQUATIONS INVOLVING ONE QUADRATIC AND ONE LINEAR EQUATION BY IDENTIFYING THE CORRECT SET OF ORDERED PAIRS AS ITS SOLUTION SET. (1) 0408

Directions: Solve algebraically the system of equations, 1596
$x^2 + y^2 = 100$, pairing
$x - y = 2$
off each value of x with the corresponding value of y.

a. $\{(-6, -8)\}$
b. $\{(8, 6)\}$
*c. $\{(-6, -8), (8, 6)\}$
d. $\{(-8, -6), (6, 8)\}$
e. $\emptyset$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE A SYSTEM OF EQUATIONS BY DETERMINING WHICH OF FIVE STEPS IS INCORRECT. (1) 0494

1. Given:

$$\begin{cases} \frac{1}{3}x - \frac{1}{2}y = 4 \\ \frac{1}{2}x - \frac{1}{3}y = 0 \end{cases}$$

Determine which one of the five steps below would not be a correct first step in the solution of the above system. 1831

a. Multiply both equations by six.
b. Multiply first equation by three and second equation by two.
c. Multiply first equation by two and second equation by three.
d. Solve second equation for x.
*e. Add first and second equation.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY CORRECT PROCEDURES IN SOLVING SYSTEMS OF EQUATION BY FINDING SOLUTION SETS FOR SYSTEMS OF EQUATIONS. (2) 0543

1. The solution set for the system $\begin{cases} xy = 4 \\ y = 2x^2 - 4x + 2 \end{cases}$ is 1984

a. $\{(2,2)\}$
b. $\{(2, 2)\ (1,4)\ (-1,4)\}$
*c. $\{(2,2)\ (c,-4c)\ (-c, 4c)\}$
d. $\{(-2.-2)\}$
e. $\{2,c,-c\}$

2. The solution set for the system $\begin{cases} 2^x = 32^y \\ 3 = x^2 - 12y^2 + 2x \end{cases}$ is 1985

*a. $\{(-5, -1)\ (\frac{15}{13}, \frac{3}{13})\}$

b. $\{\frac{1}{32},\ 32\ \frac{3}{13}\}$

c. $\{(5,1)\ ({}^{-15}/13, {}^{-3}/13)\}$

d. $\{(-1, -5)\ (3/13, 15/13)\}$

e. none of the above

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO EVALUATE SOLUTIONS BY SELECTING THE BEST METHOD TO USE IN SOLVING TWO EQUATIONS SIMULTANEOUSLY. (2) 0623

1. Which is the best method to use to find the point of intersection of $x + y = 5$ and $2x - y = 7$? 2224

*a. linear combination
b. substitution
c. graphing
d. matrices

2. Which is the best method to use to find the point of intersection of $y = 2x$ and $2x + 5y = 21$. 2225

a. linear combination
*b. substitution
c. graphing
d. matrices

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO MANIPULATE DETERMINANTS BY APPLYING VARIOUS THEOREMS IN CHOOSING EQUIVALENT FORMS. CORRECT SIGNS OF MINORS AND PROPER EXPANSIONS BY MINORS. (5) 0313

Which one of the following determinants is equal to A. 4200517

$$A = \begin{vmatrix} 2 & 5 & -6 \\ -1 & 2 & 4 \\ 3 & 1 & 5 \end{vmatrix}$$

*a. $\begin{vmatrix} 2 & 5 & -6 \\ -1 & 2 & 4 \\ 0 & 7 & 17 \end{vmatrix}$

b. $\begin{vmatrix} 2 & 5 & -6 \\ 3 & 1 & 5 \\ -1 & 2 & 4 \end{vmatrix}$

c. $\begin{vmatrix} 2 & 5 & -6 \\ -2 & 4 & 8 \\ 3 & 1 & 5 \end{vmatrix}$

d. $\begin{vmatrix} 2 & 5 & 4 \\ -1 & 2 & -2 \\ 3 & 1 & 6 \end{vmatrix}$

e. None of the above

Which second order determinant comes from A ? 4200518

$$A = \begin{vmatrix} 2 & 4 & 1 \\ 3 & 2 & -1 \\ -1 & 3 & 2 \end{vmatrix}$$

a. $\begin{vmatrix} 2 & -1 \\ 3 & 2 \end{vmatrix}$

b. $\begin{vmatrix} 3 & -1 \\ -1 & 2 \end{vmatrix}$

*c. $\begin{vmatrix} 3 & 2 \\ -1 & 3 \end{vmatrix}$

d. $\begin{vmatrix} 2 & 4 \\ -1 & 3 \end{vmatrix}$

e. None of these

In $\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ what sign will a_{23} minor have? 4200519

a. +
*b. -
c. neither

What sign will a_{31} minor have? 4200520

*a. +
b. -
c. neither

Which of the following would be a correct beginning of expanding A by minors? 4200521

$$\begin{vmatrix} -4 & 2 & 5 & 6 \\ 2 & 1 & 0 & 3 \\ 7 & 2 & -3 & 2 \\ 4 & -1 & 7 & 5 \end{vmatrix}$$

a. $2\begin{vmatrix} 2 & 5 & 6 \\ 2 & -3 & 2 \\ -1 & 7 & 5 \end{vmatrix} - \begin{vmatrix} -4 & 5 & 6 \\ 7 & -3 & 2 \\ 4 & 7 & 5 \end{vmatrix} + 3\begin{vmatrix} -4 & 2 & 5 \\ 7 & 2 & -3 \\ 4 & -1 & 7 \end{vmatrix}$

b. $-2\begin{vmatrix} 2 & 0 & 3 \\ 7 & -3 & 2 \\ 4 & 7 & 5 \end{vmatrix} + \begin{vmatrix} -4 & 5 & 6 \\ 7 & -3 & 2 \\ 4 & 7 & 5 \end{vmatrix} -2\begin{vmatrix} -4 & 5 & 6 \\ 2 & 0 & 2 \\ 4 & 7 & 5 \end{vmatrix} + \begin{vmatrix} -4 & 5 & 6 \\ 2 & 0 & 3 \\ 7 & -3 & 2 \end{vmatrix}$

c. $-6\begin{vmatrix} 2 & 1 & 0 \\ 7 & 2 & -3 \\ 4 & -1 & 7 \end{vmatrix} +3\begin{vmatrix} -4 & 2 & 5 \\ 7 & 1 & -3 \\ 4 & -1 & 7 \end{vmatrix} -2\begin{vmatrix} -4 & 2 & 5 \\ 2 & 1 & 0 \\ 4 & -1 & 7 \end{vmatrix} +5\begin{vmatrix} -4 & 2 & 5 \\ 2 & 1 & 0 \\ 7 & 2 & -3 \end{vmatrix}$

*d. $7\begin{vmatrix} 2 & 5 & 6 \\ 1 & 0 & 3 \\ -1 & 7 & 5 \end{vmatrix} -2\begin{vmatrix} -4 & 5 & 6 \\ 2 & 0 & 3 \\ 4 & 7 & 5 \end{vmatrix} -3\begin{vmatrix} -4 & 2 & 6 \\ 2 & 1 & 3 \\ 4 & -1 & 5 \end{vmatrix} -2\begin{vmatrix} -4 & 2 & 5 \\ 2 & 1 & 0 \\ 4 & -1 & 7 \end{vmatrix}$

e. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF DETERMINANTS BY EVALUATING DETERMINANTS. (2) 0549

1. The value of $\begin{vmatrix} 3 & 2 & 1 \\ -1 & 2 & 4 \\ 2 & -3 & 1 \end{vmatrix}$ is 1999

a. -59
b. -9
c. 2
*d. 59

2. The value of $\begin{vmatrix} 2 & 0 & 0 \\ 0 & 1 & 2 \\ 3 & -1 & 4 \end{vmatrix}$ is 2000

a. 4
b. 0
*c. 12
d. 8

EXPONENTS

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO MANIPULATE PHRASES CONTAINING EXPONENTS AND THE TERMS ASSOCIATED WITH EXPONENTS BY CHOOSING PHRASES WHICH FULFILL GIVEN CONDITIONS. (3) 0023

Given: a. 3^4 b. 4^3 c. 2^5 d. 5^2 e. 5^3

Choose the best answer for the following questions from the given list.

*c The phrase whose base is 2 is 4201454

*b The phrase whose common name is the same as the common name of 2^6 is 4201455

*a The phrase whose common name would be 243 if it were raised to the next highest power is 4201456

THE STUDENT DEMONSTRATES A WORKABLE KNOWLEDGE OF THE LAWS OF EXPONENTS BY SELECTING THE CORRECT ILLUSTRATION OF A GIVEN LAW. (6) 0036

$3x^2 \cdot 4x^5 =$ ____________ 4200012

a. $12x^{10}$

b. $7x^7$

*c. $12x^7$

d. $12x^{-3}$

If $(x^m)^n = x^{mn}$ what problem below exhibits this law? 4200013

a. $(4^6)^3 = 4^9$

b. $(4^6)^3 = 4^3$

c. $(4^6)^3 = 4^2$

*d. $(4^6)^3 = 4^{18}$

$\left(\frac{a^2}{b^4}\right)^3$ = ______________ 4200014

*a. $\frac{a^6}{b^{12}}$

b. $\frac{a^5}{b^4}$

c. $(a^2b^4)^3$

d. $\frac{a^1}{b^1}$

The problem $\frac{2^{10}}{2^6} = 2^4$ illustrates which law of exponents ? 4200015

a. $\frac{x^m}{x^n} = \frac{1}{x^{n-m}}$ (IF $n > m$)

b. $\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$

c. $x^m x^n = x^{m+n}$

*d. $\frac{x^m}{x^n} = x^{m-n}$ (IF $m > n$)

$(a^2\ b^3)^2 =$ __________ 4200016

a. a^0b^1

b. $a^4\ b^5$

*c. a^4b^6

d. $2a^2b^3$

$2x^3y\ (x^2y + 3y^3)\ +\ (xy)^2\ (x^3 - xy^2) =$ __________ 4200017

a. $3x^{10}y^4 + 5x^6y^8$

*b. $3x^5y^2 + 5x^3y^4$

c. $3x^5y^4 - 7x^6y^8$

d. $3x^5y^2 - 7x^3y^4$

THE STUDENT DEMONSTRATES HIS ABILITY TO MULTIPLY OR DIVIDE TERMS WITH NEGATIVE EXPONENTS BY CHOOSING THE CORRECT SIMPLIFICATION. (4) 0090

Simplify the expression $x^{-2} \cdot\ x^3$. 4200212

a. x^{-6}

*b. x

c. x^{-5}

d. x^6

Select the simplified form of $\frac{a^{-3x}}{a^{-5x}}$ 4200213

a. x^{-8x}

b. a^{-15x}

c. a 3 v

*d. a^{2x}

Express $\frac{2^{-2}\ a^{-3}}{3a^{2}\ b^{-2}}$ in equivalent form without negative exponents. 4200214

*a. $\frac{b^{2}}{12a^{5}}$

b. $12a - 5b^{-2}$

c. $\frac{a}{12b^{2}}$

d. $12a^{2}\ b^{-2}$

Express $\frac{a^{-1}m^{-4}\ n}{a^{-2}\ mn^{-3}}$ in equivalent form without negative exponents. 4200215

a. $\frac{a^{2}n^{3}}{m}$

*b. $\frac{an^{4}}{m^{5}}$

c. $\frac{n^{3}}{a^{2}m}$

d. $\frac{an^{3}}{m^{4}}$

THE STUDENT DEMONSTRATES HIS ABILITY TO SIMPLIFY A RATIONAL ALGEBRAIC EXPRESSION CONTAINING NEGATIVE EXPONENTS BY CHOOSING THE CORRECT SIMPLIFICATION. (3) 0095

Simplify: $\frac{2a - 8a^{-1}}{8a^{-2} + 2a^{-1} - 1}$ 4200230

a. $\frac{8 + 2a}{2 + a}$

b. $\frac{2a^{3} - 8a}{8a + 2}$

c. $\frac{2a\ (a + 2)}{(2 - a)}$

*d. $\frac{2a\ (a - 2)}{4 - a}$

Simplify: $\dfrac{m^{-1} + n^{-1}}{m^{-3} + n^{-3}}$ 4200231

a. $\dfrac{n + m}{mn}$

*b. $\dfrac{m^2n^2}{m^2 - mn + n^2}$

c. $\dfrac{n^3 + m^3}{(mn)^3}$

d. $\dfrac{(mn)^2}{n^2 + m^2}$

Simplify: $\dfrac{1 + (T + 1)^{-1}}{1 + 3(T - 1)^{-1}}$ 4200232

*a. $\dfrac{T - 1}{T + 1}$

b. $\dfrac{t^2 + 4t + 4}{t^2 - 1}$

c. $\dfrac{T + 2}{T + 1}$

d. $\dfrac{T^2 + 4\,T}{T - 1}$

THE STUDENT WILL BE ABLE TO DISTINGUISH BETWEEN THE COEFFICIENT, BASE, AND EXPONENT OF A TERM BY CHOOSING THE CORRECT DESCRIPTION FOR GIVEN TERM. (7) 0190

Directions: Write the letter representing the best answers in the blank provided.

D	$2\,x^3$	A. the coefficient is 2, the base is 3, the exponent is x.	4200661
B	$3x^2$	B. the coefficient is 3, the base is x, the exponent is 2.	4200662
A	$2\cdot 3^x$	C. the coefficient is x, the base is 3, the exponent is 2.	4200663
F	3^2	D. the coefficient is 2, the base is x, the exponent is 3.	4200664
E	2^3	E. the coefficient is 1, the base is 2, the exponent is 3.	4200665
F	x^3	F. None of the above	4200666
C	$x\cdot 3^2$		4200647

THE STUDENT CAN ANALYZE AN ILLUSTRATION OF THE LAWS OF EXPONENTS BY SELECTING THE PRINCIPLE ILLUSTRATED. (3) 0238

Consider the following example $2^3 \cdot 2^5 = 2^8$ 4201197

The principle which this problem illustrates can be generalized as $x^m \cdot x^n =$

a. x^{mn}

b. x^{m-n}

*c. x^{m+n}

d. $x^{\frac{m}{n}}$

Consider the following example $3^{11} \div 3^4 = 3^7$ 4201198

The principle which this problem illustrates can be generalized as $x^m \div x^n =$

a. x^{mn}

*b. x^{m-n}

c. x^{m+n}

d. $x^{\frac{m}{n}}$

Consider the following example: $(5^2)^3 = 5^6$ 4201199

The principle which this problem illustrates can be generalized as $(x^m)^n =$

*a. x^{mn}

b. x^{m-n}

c. x^{m+n}

d. $x^{\frac{m}{n}}$

THE STUDENT CAN ANALYZE GIVEN EXPRESSIONS TO SELECT AN EXPRESSION WHICH ILLUSTRATES THE COMMON RULE. (3) 0248

If $\sqrt{3} = 3^{\frac{1}{2}}$ and $\sqrt[3]{7} = 7^{\frac{1}{3}}$ then $\sqrt[n]{8} =$ 4201239

a. 8^n

*b. $8^{\frac{1}{n}}$

c. n^8

d. $n^{\frac{1}{8}}$

e. none of the above

If $\sqrt{3^5} = 3^{\frac{5}{2}}$ then $\sqrt[n]{7^m} =$ 4201240

a. $7^{\frac{n}{m}}$

b. $m^{\frac{7}{n}}$

*c. $7^{\frac{m}{n}}$

d. $n^{\frac{m}{7}}$

e. none of the above

On the basis of the above two problems, $\left(\sqrt[n]{y}\right)^m =$ 4201241

*a. $y^{\frac{m}{n}}$

b. $n^{\frac{y}{m}}$

c. $m^{\frac{n}{y}}$

d. $y^{\frac{n}{m}}$

e. none of the above

THE STUDENT CAN APPLY THE LAWS OF RATIONAL EXPONENTS TO THE USE OF IRRATIONAL EXPONENTS BY IDENTIFYING RESULTS IN PROBLEMS USING IRRATIONAL EXPONENTS IN SIMPLEST RADICAL FORM. (2) 0422

1. Simplify $10^{5-\sqrt{3}} \cdot 100^{2\sqrt{3}}$ 1647

*a. $10^{5+3\sqrt{3}}$

b. $10^{7+\sqrt{3}}$

c. $10^{20\sqrt{3}-12}$

d. $10^{5-5\sqrt{3}}$

2. Simplify $8^{\sqrt{18}} \div 4^{\sqrt{8}}$ 1648

a. $2^{\sqrt{2}}$

*b. $2^{5\sqrt{2}}$

c. $2^{1+\sqrt{2}}$

d. 2

THE STUDENT WILL BE ABLE TO SHOW HIS ABILITY TO APPLY THEOREMS ON ZERO AND NEGATIVE EXPONENTS BY WRITING EQUIVALENT EXPRESSIONS FREE OF ZERO OR NEGATIVE EXPONENTS. (3) 0513

1. An expression without zero or negative exponents equivalent to 1904

$$x^2\ y^{-1} + (\ y\ x^{-2})^{-1} \text{ is}$$

a. $\frac{x^4}{y}$

*b. $\frac{2x^2}{y}$

c. $\frac{x^4}{y^2}$

d. $\frac{x^4 + 1}{x^2 y}$

e. $\frac{2}{x^2 y}$

2. An expression, without negative exponents which is equivalent to 1905

$$\frac{x^{-1} + y^{-1}}{x^{-1} - y^{-1}}$$ is

a. $\frac{x + y}{x - y}$

b. $\frac{x - y}{x + y}$

c. 2/0

d. $\frac{x^2 - y^2}{xy}$

*e. $\frac{x + y}{y - x}$

3. An expression equivalent to $(x^{-1} - y^{-1})^{-1}$ without negative exponents is 1906

a. $x - y$

b. $\frac{y - x}{xy}$

*c. $\frac{xy}{y - x}$

d. $\frac{x - y}{xy}$

e. $\frac{xy}{x - y}$

THE STUDENT WILL BE ABLE TO SHOW HIS ABILITY TO APPLY THE THEOREMS ON EXPONENTS BY SIMPLIFYING EXPRESSIONS USING VARIABLES FOR EXPONENTS. (2) 0520

1. An expression equivalent to $\frac{(y^{n+1})^n}{y^n}$ is 1918

a. y^n

b. y^{n+1}

c. 1^{n^2+n}

*d. y^{n^2}

e. y^{n-1}

2. An expression equivalent to $\frac{(x^{n+1}\ x^{2n-1})^2}{x^{3n}}$ is 1919

*a. x^{3n}

b. x^{6n}

c. 1

d. x^{4n^2-4n-2}

e. x^{9n^2+6n}

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE LAWS OF EXPONENTS BY IDENTIFYING CORRECT SOLUTIONS FOR PROBLEMS USING THE LAW OF EXPONENTS. (3) 0626

1. Simplify: $(5a^3)$ $(-2a^2)$ = 2232

*a. $-10a^5$

b. $-10a^3$

c. $-10a^6$

d. $-10a$

2. Simplify (a^{N-1}) (a^{2N}) 2233

a. a^{N-1}

*b. a^{3N-1}

c. $a^{2N^2 - 2N}$

d. $a^{2N^2 - 1}$

3. $(A^{2N-3})^4$ = 2234

a. $4\ A^{2N-3}$

b. A^{8N-3}

*c. A^{8N-12}

d. A^{2N+1}

THE STUDENT DEMONSTRATES HIS ABILITY TO USE THE (A) PRODUCT PROPERTY OF SQUARE ROOTS (B) QUOTIENT PROPERTY OF SQUARE ROOTS BY CHOOSING THE SIMPLEST FORM FOR A GIVEN EXPRESSION. (4) 0077

$\sqrt{32}$ put into simplest form is: 4200157

a. $2\sqrt{8}$ c. $16\sqrt{2}$

*b. $4\sqrt{2}$ d. $2\sqrt{16}$

$\sqrt{100z^{2}}$ in simplest form is: 4200158

a. $10z^{2}$ c. $10\sqrt{z}$

b. $z\sqrt{10}$ *d. $10z$

$\pm\sqrt{\frac{1089}{25}} =$ 4200159

a. $\sqrt{\frac{+33}{-25}}$ c. $\pm\sqrt{\frac{33}{5}}$

b. $\sqrt{\pm\frac{33}{5}}$ *d. $\pm\frac{33}{5}$

$-\sqrt{\frac{49}{324}} =$ 4200160

a. $\frac{-\sqrt{7}}{324}$ c. $-\frac{49}{18}$

*b. $-\frac{7}{18}$ d. $-\frac{\sqrt{7}}{\sqrt{18}}$

THE STUDENT WILL BE ABLE TO FIND OR ESTIMATE SQUARE ROOTS BY APPLYING THE DEFINITION OF SQUARE ROOT OR THE ROOTING PROCESS BY SELECTING THE CORRECT APPROXIMATION. (4) 0261

Given: $\sqrt{3} \cong 1.73$
$\sqrt{2} \cong 1.41$

$2\sqrt{3}$ is approximately 4200970

*a. 3.46
b. 3.32
c. 3.26
d. 3.2

The value of $\sqrt{6}$ is approximately 4200971

a. 2.72
b. 2.54
*c. 2.44
d. 2.24

Examine the following example of the square root process

```
                 71.65
            ________________
           √ 51 34.26  00
     141     49
              234
              141
    1426      9326
              8556
   14325       77000
               71625
```

$\sqrt{6321459.37}$ will have how many digits before the decimal point? 4200972

a. two digits
b. three digits
*c. four digits
d. seven digits

The first digit in the square root $\sqrt{6321459.37}$ will be 4200973

a. 7
b. 5
c. 4
*d. 2

THE STUDENT CAN COMPREHEND THE MEANING OF NTH ROOT OF B IN THE SYSTEM OF REAL NUMBERS BY CHOOSING THE CORRECT ROOT IN TERMS OF REAL NUMBERS. (2) 0379

1. The expression, $\sqrt[4]{-16}$, in terms of real number is 1506

a. 2.
b. -2.
c. -2 and 2.
*d. undefined.

2. The expression, $\sqrt[3]{8}$, in terms of real numbers is 1507

*a. 2.
b. -2.
c. -2 and 2.
d. undefined.

THE STUDENT APPLIES HIS KNOWLEDGE OF LOGARITHMS TO SOLVE LOGARITHMIC EQUATIONS BY CHOOSING THE CORRECT SOLUTION FOR GIVEN EQUATIONS. (3) 0125

Solve for x : $\log_4 x = 3$ 4200335

a. $x = \sqrt[3]{4}$

b. $x = 81$

*c. $x = 64$

d. $x = \sqrt[4]{3}$

$\log_b 10 = \frac{1}{2}$: solve for b. 4200336

*a. $b = 100$

b. $b = (10)^{\frac{1}{2}}$

c. $b = (\frac{1}{2})^{10}$

d. $b = 10$

$\log_2 \frac{1}{8} = y$: solve for y 4200337

a. $y = \sqrt[3]{8}$

b. $y = (\frac{1}{8})^{\frac{1}{2}}$

c. $y = \emptyset$

*d. $y = -3$

THE STUDENT DEMONSTRATES HIS ABILITY TO USE LOGARITHMS TO SOLVE CERTAIN EQUATIONS BY CHOOSING THE CORRECT SOLUTION SET FOR A GIVEN EQUATION. (3) 0130

What is the correct solution for the equation $17^n = 71.5$? 4200348

*a. 1.51

b. 1.32

c. 1.63

d. 1.48

What procedure below would yield the correct solution set for $\log 2.718^2 = k$? 4200349

a. $(2.718)^2 = k$
$\log k = 2 \log 2.718$
$k = .6931$

*b. $(2.718)^k = 2$
$k \log 2.718 = \log 2$
$k = \frac{\log 2}{\log 2.718}$
$\log k = (19.4786 - 20) - (9.6378 - 10)$
$k = .6931$

c. $k^2 = 2.718$
$2 \log k = \log 2.718$
$\log k = \log \frac{2.718}{2}$
$\log k = \log 1.857$
$k = .7230$

d. $k^{2.718} = 2$
$2.718 \log k = \log 2$
$\log k = \frac{\log 2}{2.718}$
$\log k = \log 2 - \log 2.718$
$k = .5420$

What procedure would yield the correct solution set for x in $3^{x+1} = 9.82$? 4200350

a. $(x + 1) \log 3 = \log 9.82$
$x + 1 = \frac{\log 9.82}{\log 3}$
$x + 1 = \log .5150$
$x + 1 = 3.27$
$x = 2.27$

b. $(x + 1) \log 3 = \log 9.82$
$x + 1 = \log 9.82 + \log 3$
$x + 1 = \log 1.4692$
$\log x + 1 = \log 2.47$
$x + 1 = 2.47$
$x = 1.47$

*c. $(x + 1) \log 3 = \log 9.82$

$$x + 1 = \frac{\log 9.82}{\log 3} = \frac{.9921}{.4771}$$

$$\log x + 1 = (9.9965-10) - (9.6786 - 10)$$

$$\log x + 1 = .3179$$

$$x + 1 = 2.08$$

$$x = 1.08$$

d. $(x + 1) \log 3 = \log 9.82$

$$x + 1 = \log 9.82 - \log 3$$

$$x + 1 = .5240$$

$$x + 1 = 3.35$$

$$x = 2.35$$

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF THE DEFINITION OF LOGARITHM BY SELECTING THE CORRECT SOLUTION SET IN A SERIES OF QUESTIONS INVOLVING THE USE OF LOGARITHMS. (7) 0420

1. Given $\log_3 81$, what is the logarithm? 1636

a. 81
b. 3
*c. 4
d. 9

2. Given $\log_{10} 1000$, what is the logarithm? 1637

a. 1000
b. 100
c. 10
*d. 3

3. If $\log_5 x = 3$, find x. 1638

*a. 125
b. 5
c. 25
d. 15

4. If $\log_a 64 = 2$, find a. 1639

a. 4
*b. 8
c. 2
d. 64

5. If $\log_3 \sqrt[4]{3} = x$, find x. 1640

a. 3
b. 4
*c. 1/4
d. $4 \sqrt[4]{3}$

6. If $\log_3 x = -2$, find X. 1641

a. 9
*b. 1/9
c. -2
d. 3

7. If $\log_x (1/16) = -4$, find x. 1642

*a. 2
b. 1/16
c. -4
d. -2

THE STUDENT CAN UNDERSTAND THE LAWS OF LOGARITHMS BY IDENTIFYING THE SOLUTION SETS IN PROBLEMS NECESSITATING THE USE OF ONE OR MORE OF THE LAWS . (4) 0421

Direction: Given $\log_a x=4$, $\log_a y = 5$, $\log_a z=6$. Use this information in solving the following questions.

1. Determine $\text{Log}_a xy$. 1643

a. 5/4
b. a
c. 20
*d. 9

2. Determine $\log_a x^2$. 1644

*a. 8
b. 4
c. 2
d. a

3. Determine $\log_a z^{\frac{1}{2}}$. 1645

a. a
b. 1/2
*c. 0.3
d. 1.1

4. Determine $\log_a xy/Z$. 1646

a. 9.6
*b. 8.4
c. 33 1/3
d. a

THE STUDENT IS ABLE TO APPLY HIS KNOWLEDGE OF LOGARITHMS IN SOLVING ARITHMETICAL PROBLEMS DIFFICULT TO SOLVE ARITHMETICALLY BY CHOOSING THE CORRECT SET-UP OF THE PROBLEM INVOLVING THE APPLICATION OF LOGARITHMS. (3) 0427

1. Rewrite $x = \frac{75.1 \times 23.7}{2.17 \times 364}$ in a solution form using logarithms. 1665

a. $x = \text{antilog}\left[\log 75.1 + \log 23.7 + \log 2.17 + \log 364\right]$
*b. $x = \text{antilog}\left[\log 75.1 + \log 23.7 - \log 2.17 - \log 364\right]$
c. $x = \text{antilog}\left[\log 75.1 + \log 23.7 - \log 2.17 + \log 364\right]$
d. $x = \text{antilog}\left[\log 75.1 + \log 23.7 + \log 2.17 - \log 364\right]$

2. Rewrite $x = \sqrt[3]{\frac{84.95}{1.632}}$ in a solution form using logarithms. 1666

*a. $x = \text{antilog}\ 1/3\left[\log 84.95 - \log 1.632\right]$
b. $x = \text{antilog}\ 3\left[\log 84.95 - \log 1.632\right]$
c. $x = \text{antilog}\ 1/3\left[\log 84.95 + \log 1.632\right]$
d. $x = \text{antilog}\ 3\left[\log 84.95 + \log 1.632\right]$

3. Rewrite $x = \sqrt[3]{\dfrac{840 \times 72.3}{\sqrt{3.14} \times (705)^2}}$ 1667

a. $x = \text{antilog } 3[\log 840 + \log 72.3 - \frac{1}{2}\log 3.14 - 2\log 705]$

b. $x = \text{antilog } \frac{1}{3}[\log 840 + \log 72.3 - 2\log 3.14 - 2\log 705]$

c. $x = \text{antilog } 3[\log 840 + \log 72.3 - \frac{1}{2}\log 3.14 - 2\log 705]$

*d. $x = \text{antilog } \frac{1}{3}[\log 840 + \log 72.3 - \frac{1}{2}\log 3.14 - 2\log 705]$

THE STUDENT WILL BE ABLE TO SHOW HIS ABILITY TO APPLY THE PROPERTIES OF LOGARITHMS BY SOLVING EQUATIONS WITHOUT THE USE OF TABLES, INVOLVING LOGARITHMS. (4) 0538

Solve for x: 1967

1. $\log_4 |2x + 2| - \log_4 |3x + 1| = \frac{1}{2}$

a. $\{0\}$
b. $\{0, \frac{1}{2}\}$
*c. $\{0, -\frac{1}{2}\}$
d. $\{\frac{1}{2}\}$
e. $\{-\frac{1}{2}\}$

2. $\log x = 3/8 \log\sqrt{2} + 1/8 \log 2 - \frac{1}{4}\log 2 - \frac{1}{4}\log\sqrt[4]{2} + 1/8\log 8$ 1968
$- \frac{1}{4}\log 1/\sqrt{2}$

a. $3/4$
*b. $\sqrt{2}$
c. $\sqrt[4]{32}$
d. $\sqrt[4]{8}$

3. $\log_2 (9x + 5) - \log_2 (x^2 - 1) = 2$ 1969

*a. $\{3\}$
b. $\{-3/4, 3\}$
c. $\left\{\dfrac{9 \pm \sqrt{73}}{2}\right\}$
d. $\left\{\dfrac{9 \pm 5\sqrt{3}}{2}\right\}$
e. no real values of x

Solve for x: 1970

4. $\log_b x = 2 - a + \log_b \frac{a^2 b^a}{b^2}$

a. $\log_b a^2$

b. a

c. $\frac{1}{2}a$

*d. a^2

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF THE PROCESS OF INTERPOLATION BY CHOOSING THE CORRECT LOG OR ANTILOG FOR A GIVEN EQUATION. (2) 0126

If x = 32.45, find log x by process of interpolation. 4200338

a. 1. 5116

b. 1.5118

c. 1.5114

*d. 1.5112

Find an antilog y if y = 2.8811 4200339

a. 760.6

*b. 760.5

c. 760.7

d. 760.4

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF THE COMMON LOGARITHM TABLE BY FINDING THE LOG OR ANTI-LOG OF A GIVEN NUMBER. (5) 0424

Directions: The following table is an excerpt from a table of common logarithms. Use it in answering the following questions.

N	0	1	2	3	4	. . .
59	7709	7716	7723	7731	7738	. . .
60	7782	7789	7796	7803	7810	. . .
61	7853	7860	7868	7875	7882	. . .

1. Find the logarithm of 592. 1652

a. 0.7723
b. 1.7723
*c. 2.7723
d. 2.7724

2. Find the logarithm of $(60.3)^3$. 1653

a. 1.7803
*b. 5.3409
c. 2.3409
d. 8.3409

3. Find the logarithm of 0.6134. 1654

a. 0.7878
b. 9.7875 - 10
c. 9.7882 - 10
*d. 9.7878 - 10

4. Find antilog 8.7720 - 10 1655

a. 0.5916
*b. .05916
c. 591.6
d. 59.16

5. Find antilog 3.7864 1656

a. .6115
b. 6.115
c. 61.15
*d. 6115

THE STUDENT CAN TRANSLATE EXPONENTIAL FORM AND LOGARITHMIC BY SELECTING THE CORRECT ALTERNATIVE FORM. (1) 0287

Which of the following statements is equivalent to $y = \log_b x$? 4201367

a. $y^b = x$

b. $x^b = y$

c. $b^x = y$

*d. $b^y = x$

e. $x^y = b$

THE STUDENT DEMONSTRATES HIS ABILITY TO TRANSLATE EXPONENTIAL AND LOGARITHMIC FUNCTIONS BY CHOOSING THE CORRECT ALTERNATIVE FORM OF A GIVEN FUNCTION. (7) 0124

The exponential form of $\log_2 64 = 6$ 4200328

a. $(64)^{\frac{1}{2}} = 6$

b. $6^2 = 36$

*c. $2^6 = 64$

d. $\sqrt[6]{64} = 6$

The logarithmic form of $3^2 = 9$ is: 4200329

a. $\log_9 3 = 2$

b. $\log_2 9 = 3$

*c. $\log_3 9 = 2$

d. $\log_3 2 = 9$

The exponential form of $\log_{\frac{1}{3}} 9 = -2$ is : 4200330

a. $(9)^{\frac{1}{2}} = 3$

*b. $(\frac{1}{3})^{-2} = 9$

c. $(-2)^{\frac{1}{3}} = 9$

d. $(\sqrt[3]{2})^9 = 9$

The logarithmic form of $64^{-\frac{1}{6}} = \frac{1}{2}$ is: 4200331

*a. $\log_{64}\frac{1}{2} = \frac{1}{6}$

b. $\log_{-\frac{1}{5}} 64 = \frac{1}{2}$

c. $\log_{\frac{1}{2}}64 = -\frac{1}{6}$

d. $\log_{-\frac{1}{6}} \frac{1}{2} = 64$

The value of $\log_5 5$ is: 4200332

a. 125

*b. 1

c. 2

d. $5\frac{1}{2}$

The value of $\log_{10} 0.01$ is: 4200333

a. 10^2

b. 2

c. 10^{-2}

*d. -2

The value of $\log_{\frac{1}{2}} \frac{1}{4}$ is: 4200334

a. -2

b. $2\frac{1}{2}$

c. 4

*d. 2

THE STUDENT CAN TRANSLATE A LOGARITHMIC EQUATION INTO AN EXPONENTIAL EQUATION TO DETERMINE THE SOLUTION SET BY IDENTIFYING THE SOLUTION SET OF THE LOGARITHMIC EQUATION. (4) 0426

1. Solve $\log_6 x + \log_2 8 = \log_2 64$ for x. 1661

a. 8
*b. 216
c. 56
d. ∅

2. Solve log 25 + log x = log 100 for x. 1662

*a.. 4
b. ∅
c. 75
d. 2500

3. Solve $\log_3 x^3 - 2 = \log_3 x$ for x. 1663

a. ± 3
b. -3
*c. +3
d. ∅

4. Solve 2 log (2-x) - log8 = log (2-x) for x. 1664

a. ± 6
b. +6
c. ∅
*d. -6

THE STUDENT CAN UNDERSTAND THE NUMERICAL MAKE-UP OF THE LOGARITHM BY USING THE VOCABULARY OF LOGARITHMS CORRECTLY IN COMPLETING STATEMENTS. (4) 0425

Directions: Use the choices below to correctly complete the statements in the following questions.

a. characteristic
b. decimal
c. exponent
d. numeral
e. mantissa

b 1. The logarithm consists of an integer plus a(n)________. 1657

a 2. The integral part is the________of the logarithm. 1658

e 3. The decimal point is the________of the logarithm. 1659

a 4. The________of the logarithm depends on the location of the decimal point of the given number. 1660

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF THE VOCABULARY OF LOGARITHMS BY COMPLETING STATEMENTS WITH CHOICES FROM A GIVEN LISTING. (4) 0428

Directions: Using the choices listed below complete the statements in the next form questions.

a. finding the number having given its logarithm.
b. writing the logarithm having given the number.
c. assuming that small intervals of the graph, $y = \log x$, are straight lines.
d. writing the exponential function and its restrictions.
e. inspection of the number in standard form.

e 1. The characteristic of the common logarithm of a number is formed by ____________. 1668

c 2. In using linear interpolation, you determine the mantissa of a logarithm by___________. 1669

d 3. The question asking for the writing of the inverse function of the logarithmic function is answered by____________. 1670

a 4. The question asking that you find the antilogarithm is answered by_____________. 1671

THE STUDENT CAN RECALL THE LAWS OF LOGARITHMS BY SELECTING FROM A LISTING THE ONE EXAMPLE WHICH IS NOT A LAW OF LOGARITHMS. (1) 0429

1. Which one of the following is not a law of logarithms? 1672

a. $\log ab = \log a + \log b$

b. $\log \frac{a}{b} = \log a - \log b$

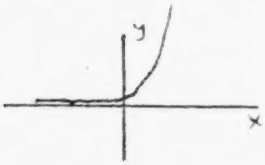
*c. $\log (a + b) = \log a + \log b$

d. $\log a^n = n \log a$

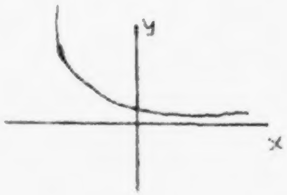
THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF GRAPHING AN EXPONENTIAL FUNCTION BY CHOOSING THE CORRECT GRAPH FOR A GIVEN FUNCTION. (4) 0123

The graph of $\{(x, y) \mid y = 4^x\}$ is : 4200324

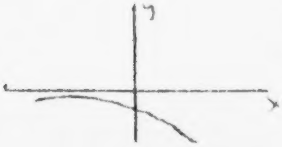
*a.



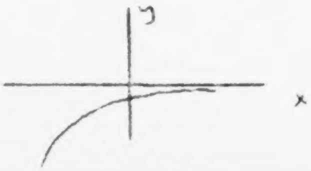
c.



b.

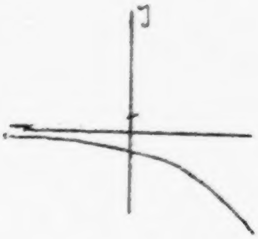


d.

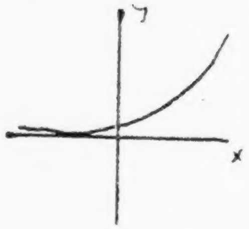


The graph of $y = (\frac{1}{2})^{x}$ is: 420032

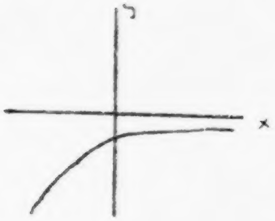
a.



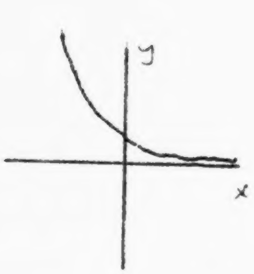
c.



b.

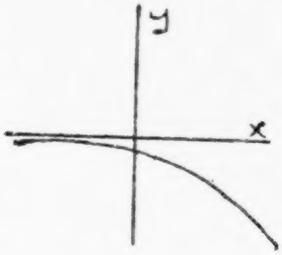


*d.

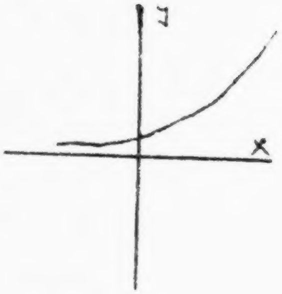


The graph of $\left\{(x,y) \,\middle|\, y = (\frac{1}{2})^{-x}\right\}$ 420032

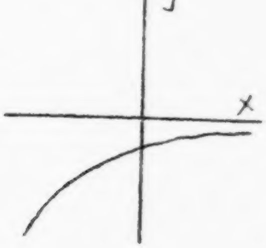
a.



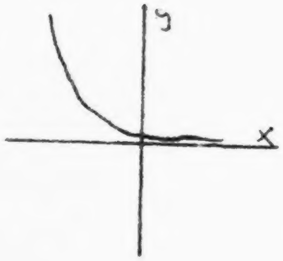
*c.



b.

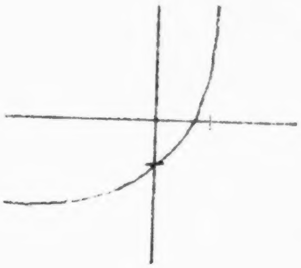


d.

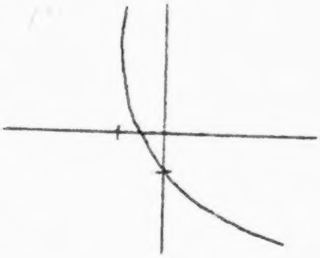


The graph of $\left\{(x,y) \mid y = 3^{x} - 2\right\}$ 4200327

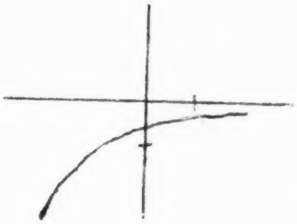
*a.



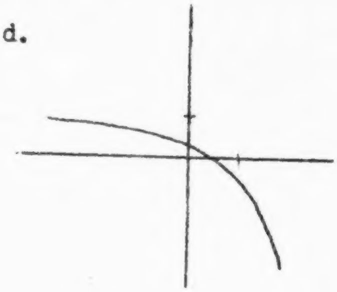
c.



b.



d.



THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE PRODUCT AND/OR QUOTIENTS OF REAL NUMBERS BY USING LOGARITHMS, BY CHOOSING THE CORRECT PROCEDURE FOR A GIVEN PRODUCT OR QUOTIENT. (2) 0127

Find the product of 4.76 and 86.1 using logarithms 4200340

*a. (4.76)(86.1) = N
log 4.76 + log 86.1 = logN
.6776 + 1.9350 = logN
410 = N

b. (4.76)(86.1) = N
log 86.1 - log 4.76 = logN
1.2374 = logN
173 = N

c. (4.76)(86.1) = N
(log 4.76)(log 86.1) = logN
62.25 = N

d. (4.76)(86.1) = N
log 4.76 + log 86.1 = logN
1.6776 + 1.9350 = logN
2.2126 = logN
410 = N

Divide 7.02 by 5.57 using logarithms 4200341

a. $\log \frac{7.02}{5.57} =$
$\log N = \log 7.02 + \log 5.57$
$\log N = \log 1.5922$
$N = 39.2$

*b. $\log \frac{7.02}{5.57} =$
$\log N = \log 7.02 - \log 5.57$
$\log N = \log .1004$
$N = 1.26$

c. $\log \frac{7.02}{5.57} =$
$\log N = \log 5.57 - \log 7.02$
$\log N = \log .1004$
$N = 1.26$

d. $\log \frac{7.02}{5.57} = \log N$
$\log N = (\log 7.02)(\log 5.57)$
$\log N = \log (36.14)$
$\log N = 31.3$

GIVEN EXPRESSIONS SUCH AS $(4.35)^3$ AND $\sqrt[4]{3.61}$ THE STUDENT DEMONSTRATES HIS ABILITY TO USE LOGARITHMS TO EVALUATE SUCH EXPRESSIONS BY CHOOSING THE CORRECT VALUE FOR EACH EXPRESSION. (3) 0128

Use logarithms to find the value of $(3.87)^3$ 0342

*a. $(3.87)^3 = 58$

b. $(3.87)^3 = 34$

c. $(3.87)^3 = 43$

d. $(3.87)^3 = 39$

What procedure below would give the best result for $\sqrt[3]{56.4}$? 0343

a. $3 \log 56.4 = \log n$
$3\ (1.7513) = \log n$
$5.2539 = \log n$
$2.79 = n$

b. $\log 3 - \log 56.4 = \log n$
$.4771 - 2.7513 = \log n$
$2.2742 = \log n$
$2.88 = n$

*c. $\frac{1}{3} \log 56.4 = \log n$
$\frac{1}{3}\ (1.7513) = \log n$
$.5838 = \log n$
$3.84 = n$

d. $\log 3 + \log 56.4 = \log n$
$.4771 + 2.7513 = \log n$
$5.5284 = \log n$
$3.38 = n$

Evaluate $\sqrt[4]{(872)^3}$ using logarithms 0344

a. 112
b. 123
c. 148
*d. 160

GIVEN AN EXPRESSION OF THE TYPE $\frac{4.63^3 \text{ X } \sqrt{6.21}}{\sqrt[3]{4.32}}$ THE STUDENT DEMONSTRATES HIS ABILITY TO INTEGRATE ALL THE FUNDAMENTAL PROPERTIES OF LOGARITHMS TO SIMPLIFY THE EXPRESSION BY CHOOSING THE CORRECT SIMPLIFICATION. (3) 0129

What is the logarithmic equation you would use to compute $\frac{(86)(0.45)}{57.4}$? 0345

a. $\log n = \log 86 - \log 0.45 + \log 57.4$

b. $\log n = (\log 86)(\log 0.45) - \log 57.4$

*c. $\log n = \log 86 + \log 0.45 - \log 57.4$

d. $\log n = \log 86 - \log 0.45 - 57.4$

What is the logarithmic equation you would use to compute $\frac{(3072)\sqrt[3]{0.8400}}{(2.634)^2}$? 0346

*a. $\log n = \log 3072 + \frac{1}{3} \log 0.8400 - 2 \log 2.634$

b. $\log n = \log 3072 + 3 \log 0.8400 - 2 \log 2.634$

c. $\log n = \log 3072 + 3 \log 0.8400 + \log 2.634$

d. $\log n = \log 3.72 - 3 \log 0.8400 + 2 \log 2.634$

What is the logarithmic equation you would use to compute $\frac{(0.9200)^5 (7032) (1.367)}{(317.0)\sqrt{.0684}}$? 0347

a. $5 \log 0.9200 + \log 7032 + 1.367 - (\log 317 - \frac{1}{2} \log .0684)$

b. $5 \log 0.9200 + \log 7032 - \log 1.367 + (\log 317 - \frac{1}{2} \log .0684)$

c. $5 \log 0.9200 + \log 7032 + \log 1.367 - (\log 317 - \log .0684)$

*d. $5 \log 0.9200 + \log 7032 + \log 1.367 - (\log 317 + \frac{1}{2} \log .0684)$

THE STUDENT DEMONSTRATES HIS ABILITY TO APPLY THE BASIC THEOREMS OF LOGARITHMS BY SELECTING EQUIVALENT FORMS FOR GIVEN EXPRESSIONS. (1) 0288

Which of the following is equivalent to $\log_4 7 - \log_4 2$? 1368

a. $\log_4 5$

b. $\log_4 14$

*c. $\log_4 (\frac{7}{2})$

d. $\log_4 9$

e. $\frac{\log_4 7}{\log_4 2}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE THE DERIVATION OF A FORMULA TO CHANGE LOGARITHMIC BASES BY IDENTIFYING A STEP THAT IS INCORRECT. (1) 0519

1. If a,b, and c are positive numbers and $a^x = b$ and $c^y = b$, then one of the following is not a correct step in deriving 1917

$$\log_c b = \frac{\log_a b}{\log_a c}$$

a. $x = y \log_a c$

*b. $\log_a x = \log_c y$

c. $a^x = c^y$

d. $\log_a b = \log_c b \log_a c$

e. all of the above are correct steps

THE STUDENT WILL BE ABLE TO SHOW HIS ABILITY TO APPLY THE PRINCIPLES OF LOGARITHMS BY FINDING UNKNOWN VALUES IN EXPRESSIONS CONTAINING MORE THAN ONE LOGARITHM TO DIFFERENT BASES. (2) 0528

1. The value of x in $\log_2[\log_4(\log_{10}x)] = -1$ is: 1936

*a. 100
b. 1/80
c. 80
d. 20
e. 1/100

2. The value of x in $\log_2[\log_2(\log_2 16)] = x$ 1937

a. 2
b. 3
c. 4
*d. 1
e. 4/3

FRACTIONS, DECIMALS AND PROPORTIONS

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF THE COMMON NAME OF FRACTIONS BY SELECTING FRACTIONS WITH A SIMILIAR COMMON NAME. (3) 0022

Which pair of fractions have the same common name 1451

a. $(\frac{12}{20}, \frac{15}{27})$

*b. $(\frac{33}{39}, \frac{44}{52})$

c. $(\frac{63}{56}, \frac{81}{64})$

d. $(\frac{21}{24}, \frac{32}{36})$

The common name of $\frac{3}{8} + \frac{7}{12}$ is 1452

a. $\frac{10}{20}$

b. $\frac{92}{108}$

c. $\frac{27}{24}$

*d. $\frac{23}{24}$

Which of the following name the same number as $\frac{1}{9} + \frac{5}{27}$ 1453

*a. $(2/3)^3$

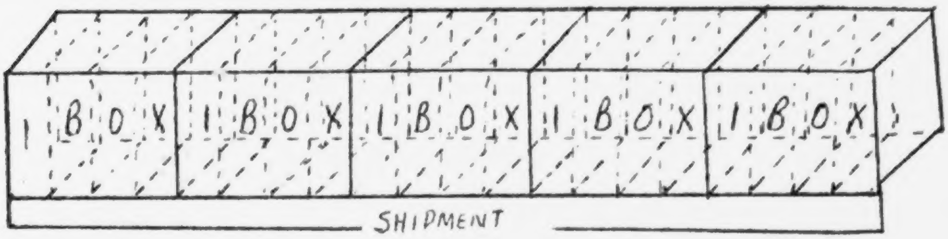
b. $\frac{6}{36}$

c. $\frac{62}{216}$

d. $\frac{5}{9} + \frac{1}{27}$

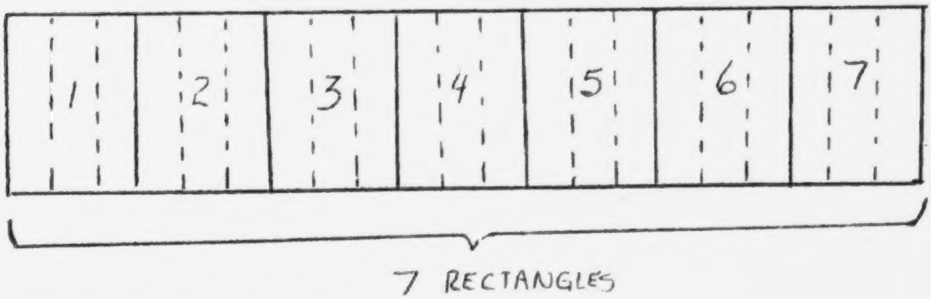
THE STUDENT CAN DEMONSTRATE A COMPREHENSION OF THE CONCEPT OF FRACTION BY CHOOSING THE CORRECT QUANTITY WHICH WOULD REPRESENT A CERTAIN FRACTION OF A PARTICULAR QUANTITY. (2) 0454

1. The sketch depicts a shipment of 5 boxes. Each box has been divided into fourths for your convenience. Using the sketch for reference which answer best expresses the measure of 3/4 of the shipment. 1737



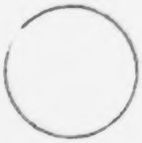
a. 4 boxes
b. 3/4 box
c. 3 boxes
*d. 3 3/4 boxes
e. 3 1/4 boxes

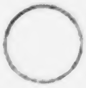
2. The sketch consists of seven rectangles each of which is divided into thirds for your convenience. The seven rectangles represent a certain quantity. Using the sketch for reference which answer best expresses the measure of 2/3 of this quantity. 1738

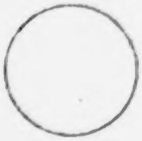
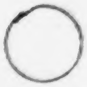


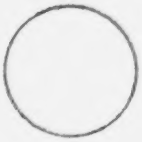
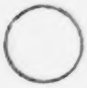
a. 2 1/3 rectangles
b. 3 rectangles
c. 2/3 rectangle
*d. 4 2/3 rectangle
e. 5 1/3 rectangle

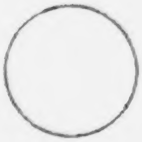
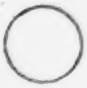
THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY HIS KNOWLEDGE OF THE MEANING OF A FRACTION BY COMPARING FRACTIONAL PARTS OF TWO QUANTITIES. (4) 0467

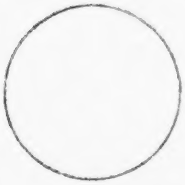
1. How does 1/10 of  1765

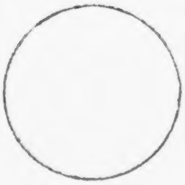
compare with 1/10 of  ?

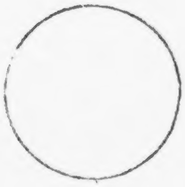
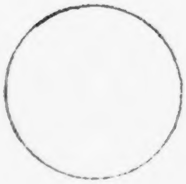
*a. 1/10 of  is greater than 1/10 of  .

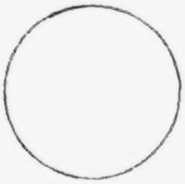
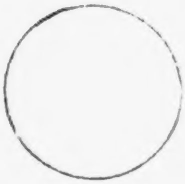
b. 1/10 of  is the same as 1/10 of  .

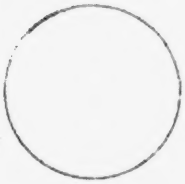
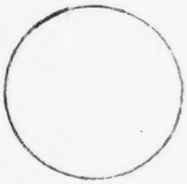
c. 1/10 of  is smaller than 1/10 of  .

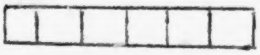
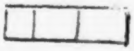
2. How does 3/5 of  1766

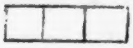
compare with 3/4 of  ?

a. 3/5 of  is greater than 3/4 of  .

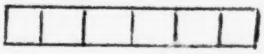
b. 3/5 of  is the same as 3/4 of  .

*c. 3/5 of  is smaller than 3/4 of  .

3. How does 1/6 of  compare with 1/3 of  ?

a. 1/6 of is greater than 1/3 of  .

*b. 1/6 of is the same as 1/3 of .

c. 1/6 of  is smaller than 1/3 of .

4. How does 3/5 of $100 compare with 2/5 of $150 ?

a. 3/5 of $100 is greater than 2/5 of $150.

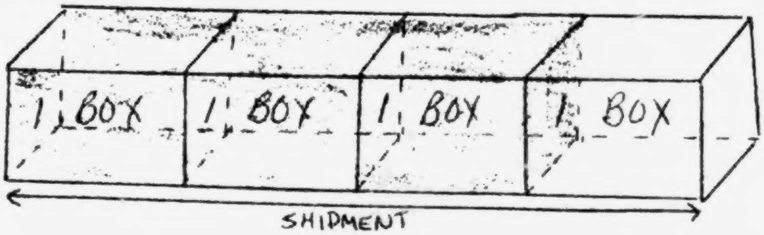
*b. 3/5 of $100 is the same as 2/5 of $150.

c. 3/5 of $100 is smaller than 2/5 of $150.

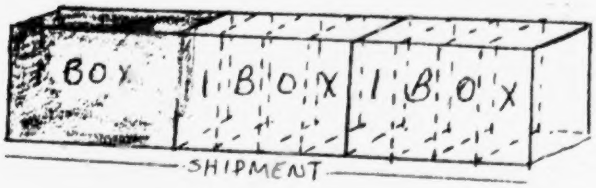
THE STUDENT CAN COMPREHEND THE CONCEPT OF FRACTION BY CHOOSING FROM A NUMBER OF SKETCHES THAT SKETCH WHICH DOES *NOT* CORRECTLY DEPICT THE SPECIFIC FRACTION REFERRED TO. (1) 0444

1. Which of the following 5 sketches does not correctly depict 3/4 of a shipment. 1717

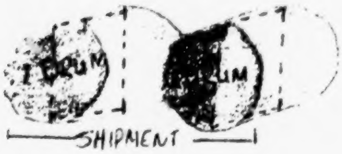
a.



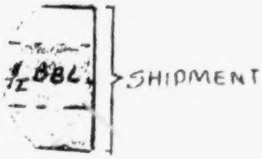
*b.


1 BOX
1 BOX
1 BOX
SHIPMENT

c.


1 DRUM
DRUM
SHIPMENT

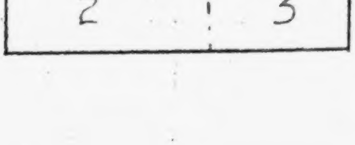
d.


1/2 BBL
SHIPMENT

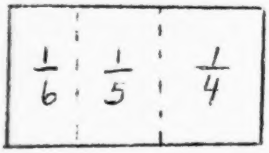
THE STUDENT CAN DEMONSTRATE A COMPREHENSION OF THE NUMBER CONCEPT OF ADDING FRACTIONS BY CHOOSING THE CORRECT ANSWER TO A NATURAL SITUATION OF ADDITION THAT IS DEPICTED PICTORIALLY. (3) 0446

1. Pick the simplest numeral that would represent the entire quantity. . 1722

a. 1/5
b. 2/5
c. 2/6
d. 3/5
*e. 5/6

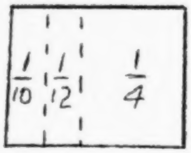


2. Pick the simplest numeral that would represent the entire quantity. 1723



a. 3/120
b. 1/120
c. 3/15
d. 1/40
*e. 37/60

3. Pick the simplest numeral that would represent the entire quantity. 1724

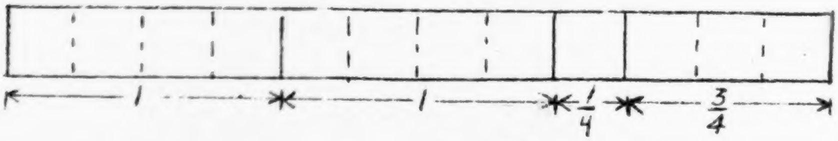


a. 3/26
b. 1/26
c. 3/60
d. 1/20
*e. 13/30

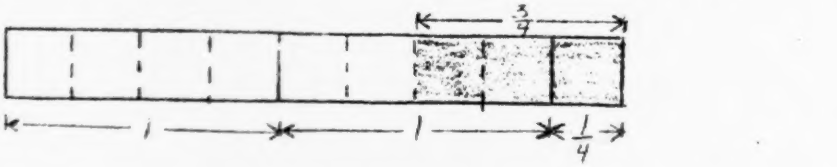
THE STUDENT CAN DEMONSTRATE A COMPREHENSION OF THE NUMBER CONCEPT AS RELATED TO SUBTRACTING FRACTIONS BY CHOOSING THE SKETCH WHICH CORRECTLY DEPICTS A PARTICULAR SUBTRACTION PROBLEM. (1) 0448

1. Which sketch correctly depicts the subtraction problem 1726
2 1/4 - 3/4 ?

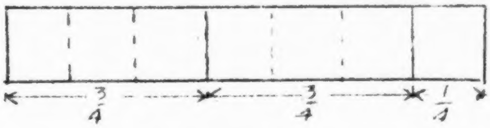
a.



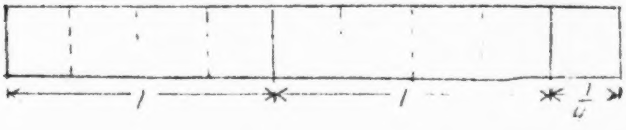
*b.



c.



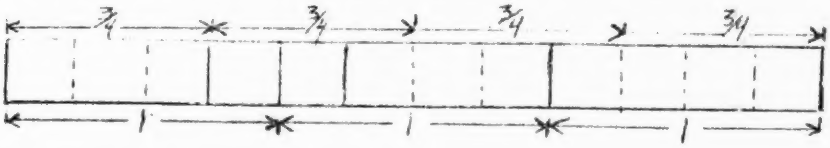
d.



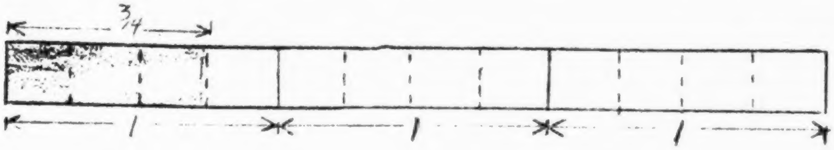
THE STUDENT CAN DEMONSTRATE A COMPREHENSION OF THE NUMBER CONCEPT OF DIVISION BY A FRACTIONAL QUANTITY BY CHOOSING THE SKETCH WHICH CORRECTLY DEPICTS A PARTICULAR DIVISION PROBLEM. (2) 0451

1. Select the sketch which correctly depicts the problem of $3 \div 3/4$ 1731

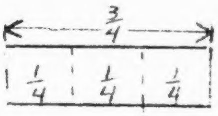
*a.


3/4
3/4
3/4
3/4
1
1
1

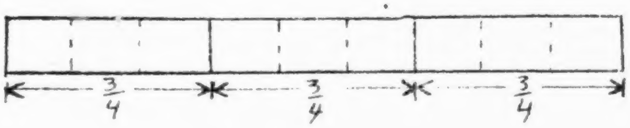
b.



c.



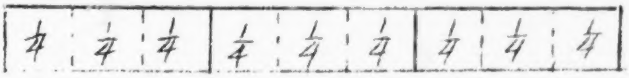
d.



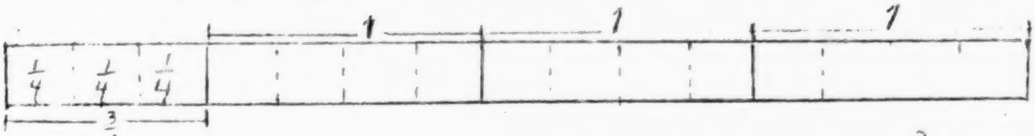
THE STUDENT CAN DISPLAY AN UNDERSTANDING OF THE NUMBER CONCEPT OF MULTIPLYING FRACTIONS BY CHOOSING THE CORRECT PICTORIAL DESCRIPTION OF A MULTIPLICATION PROBLEM FROM SEVERAL PLAUSIBLE ALTERNATIVES. (2) 0452

1. Which of the following sketches correctly represents 3 x 3/4 1733

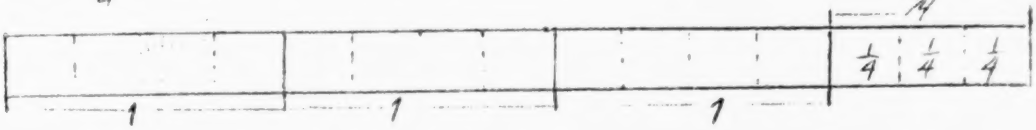
*a.


1/4
1/4
1/4
1/4
1/4
1/4
1/4
1/4
1/4

b.


1
1
1
1/4
1/4
1/4
3/4

c.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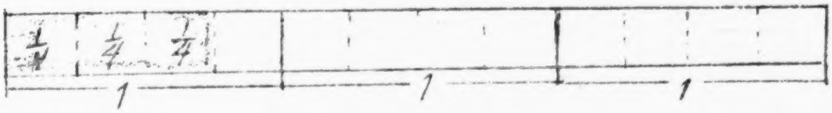
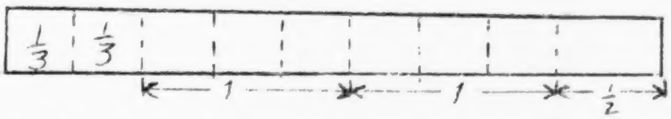
d.



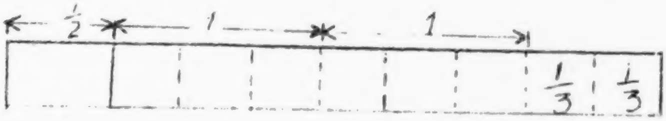
2. Which of the following sketches correctly represents 1734

$2\frac{1}{2}$ x 2/3 ?

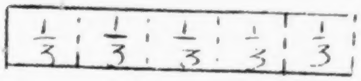
a.



b.



*c.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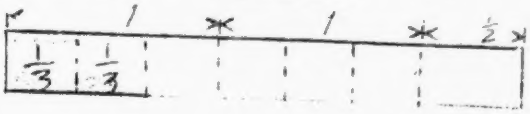
1/3

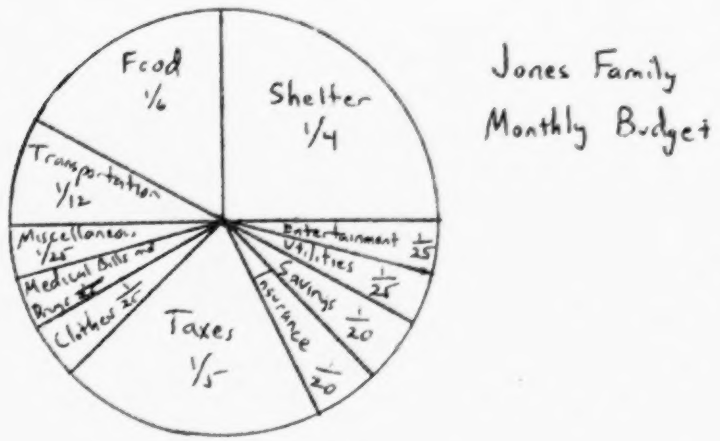
d.

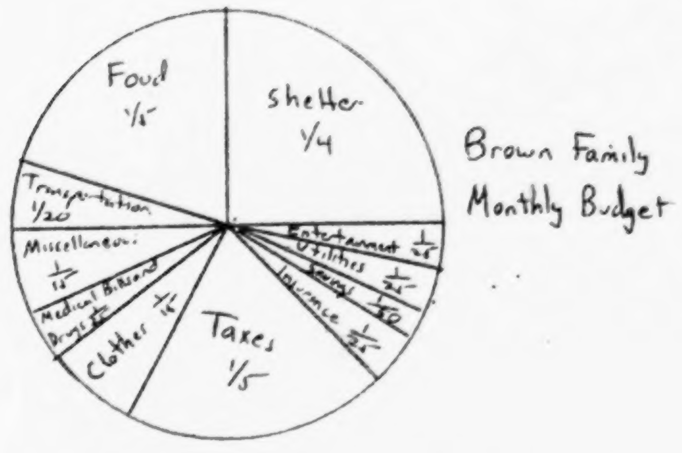


THE STUDENT WILL DEMONSTRATE HIS ABILITY TO INTERPRET A CIRCLE GRAPH WITH FRACTIONS BY STATING THE TRUTH OR FALSITY OF STATEMENTS ABOUT THE GRAPH. (5) 0490

Directions: Using the graphs below, answer the statements that follow using this key:

a. means the statement is definitely true.
b. means that the information given is not sufficient to indicate the truth or falsity of the statement.
c. means the statement is definitely false.





1. The Jones family has the same monthly income as the Brown family. 1816

a.
*b.
c.

2. Both families are spending the same part of their monthly income for shelter. 1817

*a.
b.
c.

3. The Jones family would rather travel than eat. 1818

a.
*b.
c.

4. The Brown family spends a greater part of their money on insurance than the Jones family. 1819

a.
b.
*c.

5. The Jones family saves more than the Brown family. 1820

a.
*b.
c.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY THE RULE FOR ADDING FRACTIONS BY SOLVING A PRACTICAL PROBLEM. (2) 0475

1. Joan's mother bought two chickens, one weighing $3\frac{7}{8}$ lb. and the other $4\frac{3}{4}$ lb. What was the total weight of the chickens? (express answer in simplest terms.) 1778

a. $7\frac{5}{6}$ lb.

*b. $8\frac{5}{8}$ lb.

c. $8\frac{1}{4}$ lb.

d. $8\frac{1}{2}$ lb.

2. Find the perimeter of a triangle if its sides measure $2\frac{5}{8}$ inches, $1\frac{11}{16}$ inches, and $1\frac{3}{4}$ inches. (express answer in simplest terms.) 1779

*a. $6\frac{1}{16}$ inches

b. $5\frac{9}{16}$ inches

c. $4\frac{19}{28}$ inches

d. $5\frac{7}{16}$ inches

THE STUDENT DEMONSTRATES HIS ABILITY TO ADD OR SUBTRACT ALGEBRAIC FRACTIONS BY CHOOSING THE CORRECT SUMS OR DIFFERENCES. (4) 0058

Add $\frac{x - y}{x + y}$ and $\frac{x + y}{x - y}$. 0095

a. $\frac{2x}{(x + y)}\ (x - y)$

*b. $\frac{2x^2 + 2y^2}{x^2 - y^2}$

c. $\frac{x^2 - y^2}{(x + y)}$

d. $\frac{x}{x^2\ y^2}$

$\frac{x}{x^2 - 25} - \frac{1}{2x + 10} =$ ______? 0096

a. $\frac{x - 1}{x^2 - 25}$

b. $\frac{x - 1}{2x + 10}$

c. $\frac{x - 1}{(x^2 - 25)(2x + 10)}$

*d. $\frac{1}{2(x - 5)}$

Subtract $\frac{4x}{x^2 + x}$ from $\frac{7x}{x + 1}$ 0097

*a. $\frac{7x^2 - 4x}{x(x + 1)}$

b. $\frac{3x}{x^2 + x}$

c. $\frac{4x - 7x^2}{x^2 + x}$

d. $\frac{11x}{x^2 + x}$

If the difference between two algebraic terms is $\frac{28}{3a}$ and one of the terms is $\frac{9a + 7}{3a}$ the other algebraic would be: 0098

a. $9a - 21$
b. $-\frac{21}{3a}$

*c. $\frac{3a - 7}{a}$

d. $\frac{a + 7}{3a}$

THE STUDENT WILL BE ABLE TO ADD OR SUBTRACT FRACTIONS THAT HAVE ONE OR MORE TERMS IN EACH DENOMINATOR BY CHOOSING THE CORRECT SUM OR DIFFERENCE. (10) 0208

The difference of $\frac{9}{a} + \frac{3}{a}$ expressed in reduced form is 0773

*a. $\frac{6}{a}$

b. $\frac{12}{2}$

c. $\frac{12}{a}$

d. $\frac{27}{a^2}$

The sum of $\frac{4}{B} + \frac{3}{AB}$ expressed in reduced form is 0774

a. $\frac{7}{AB^2}$

*b. $\frac{4A + 3}{AB}$

c. $\frac{4 + 3A}{AB^2}$

d. $\frac{4 + 3A}{2AB}$

e. none of above

The sum of $\frac{3x + 2}{15} + \frac{x - 5}{10}$ expressed in reduced form is 0775

a. $\frac{11x - 4}{30}$

b. $\frac{9x + 19}{30}$

c. $\frac{9x - 3}{30}$

d. $\frac{11x + 19}{30}$

*e. none of the above

The sum of $\frac{4}{x} + \frac{3}{x-2}$ expressed in reduced form is 0776

*a. $\frac{7x - 8}{x(x - 2)}$

b. $\frac{7x - 6}{x(x - 2)}$

c. $\frac{-7x + 6}{x(x - 2)}$

d. $\frac{7}{2x - 2}$

e. none of the above

The expression $5 - \frac{2}{x - y}$ written in simplified form is 0777

a. $\frac{5 - 2x + 2y}{x - y}$

b. $\frac{5x - 5y + 2}{(x - y)}$

c. $\frac{7}{x - y}$

*d. $\frac{5x - 5y - 2}{(x - y)}$

e. none of the above

The sum of the expression $\frac{3x + y}{x} + \frac{3x + y}{y}$ written in simplified form is 0778

a. $\frac{6x + 2y}{x + y}$

b.. 8

*c. $\frac{3x^2 + 4xy + y^2}{xy}$

d. $\frac{9x^2 + 6xy + y^2}{xy}$

e. none of the above

The difference $\frac{8x + y}{x + y} - \frac{3x + 3y}{x + y}$ written in simplified form is 0779

a. $5x - 2y$

b. $\frac{5x + 4y}{x + y}$

c. $\frac{5x + 4y}{2(x + y)}$

d. $\frac{5x - 2y}{2(x + y)}$

*e. none of the above

The sum $\frac{8}{y^2 + 3x + 2} + \frac{4}{x^2 + 3x + 2}$ written in reduced form is 0780

*a. $\frac{12}{x^2 + 3x + 2}$

b. $\frac{12(x^2 + 3x + 2)}{x^2 + 3x + 2}$

c. $\frac{12x^2 + 36x + 24}{x^2 + 3x + 2}$

d. $8(x + 2) + 4(x + 1)$

e. none of the above

The sum of $\frac{5}{x + 2} + \frac{3}{x + 3}$ written in reduced form is 0781

a. $\frac{8}{x + 5}$

b. $\frac{8x + 19}{2x + 5}$

*c. $\frac{8x + 21}{(x+2)(x+3)}$

d. $\frac{8x + 6}{(x+2)(x+3)}$

e. none of the above

The expression $\frac{6x}{x^2 - 4} + \frac{4}{x + 2}$ written in reduced form is 0782

a. $\frac{6x + 4}{x^2 + x - 2}$

b. $\frac{x^2 - 1}{x^2}$

c. $\frac{2(x - 1)}{x^2 - 4}$

*d. $\frac{2(5x - 4)}{x^2 - 4}$

e. none of the above

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF MULTIPLICATION OF FRACTIONS BY CHOOSING THE CORRECT PRODUCT, IN LOWEST TERMS, OF TWO OR MORE ALGEBRAIC FRACTIONS. (4) 0055

The product of $\frac{x^2 + 2x + 1}{x + 2}$ and $\frac{x^2 + 4x + 4}{x + 1}$ is 0085

a. $\frac{x^4 + 6x^3 + 13x^2 + 12x + 4}{x^2 + 3x + 2}$

*b. $x^2 + 3x + 2$

c. $x^2 + 2$

d. $\frac{x + 2}{x + 1}$

The product of $\frac{3ab^2 - 27ax^2}{3} \cdot \frac{1}{ab + 3ax}$ in lowest terms is 0086

a. $\frac{3ab^2 - 27ax^2}{3ab + 9ax}$

b. $3a\ (b - 3x)$

*c. $b - 3x$

d. $\frac{b - 3x}{3}$

The product, in lowest terms, of $\frac{x^2 - 5x - 24}{x + 3} \cdot \frac{2}{8 - x}$ is 0087

a. $\frac{(x + 3)(x - 8)}{8 - x}$

b. $\frac{2}{x + 3}$

*c. -2

d. $\frac{x - 8}{8 - x}$

The product of $\frac{24x^2}{3(x^2 - 4x + 4)} \cdot \frac{3x - 6}{2x}$ is 0088

a. $\frac{24x^2}{x - 2}$

b. $\frac{12x}{2x}$

*c. $\frac{12x}{x - 2}$

d. $\frac{3}{2x}$

THE STUDENT DEMONSTRATES A WORKABLE KNOWLEDGE OF DIVISION OF ALGEBRAIC FRACTIONS BY CHOOSING THE CORRECT QUOTIENT FOR EACH FRACTION. (4) 0056

The quotient of $\frac{4a^2}{7} \div 8a$ is 0089

*a. $\frac{a}{14}$

b. $\frac{14}{a}$

c. $\frac{36a^3}{7}$

d. $\frac{9}{56}$

$\frac{3(x^2 - 2x + 1)}{x} \div (\quad ? \quad) = x - 1$ what is the missing divisor term? 0090

a. $\frac{x}{3(x - 1)}$

b. $\frac{x - 1}{x}$

c. $\frac{x}{x - 1}$

*d. $\frac{3(x - 1)}{x}$

Divide $\frac{x^2 - y^2}{x + y}$ by $\frac{x - y}{a}$. 0091

a. $x - y$
*b. a
c. $\frac{a}{x-y}$
d. $\frac{x + y}{x - y}$

The quotient of $\frac{x^4 - y^4}{x + y} \div \frac{x^2 + y^2}{y}$ is ______? 0092

a. $y \frac{(x^2 - y^2)}{x + y}$

*b. $y (x - y)$

c. $y (x + y)$

d. $y \frac{(x^2 + y^2)}{x + y}$

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF THE MECHANICAL PROCESS OF DIVIDING BY A FRACTIONAL NUMERAL BY CHOOSING THE CORRECT ANSWER TO A PARTICULAR PROBLEM INVOLVING THIS PROCESS. (2) 0453

1. $3 \div 3/4 =$ 1735

a. 3/4
b. 3
c. $\frac{1}{4}$
*d. 4
e. $2\frac{1}{4}$

2. $3\ 1/3 \div 2/3 =$ 1736

a. 4
b. 2 1/3
*c. 5
d. 2/3
e. 2 2/3

THE STUDENT CAN SHOW A COMPREHENSION OF THE CONCEPT OF EQUIVALENCE ROW OF A SIMPLE FRACTION BY CHOOSING THE CORRECT LISTING OF THE EQUIVALENCE ROW FROM SEVERAL PLAUSIBLE ALTERNATIVES. (1) 0447

1. Which of the following is the correct listing of the equivalence row of the fraction 2/3 ? 1725

a. 2/3 = 4/6 = 8/12 = 16/24 = 32/48 = ...

b. 2/3 = 3/4 = 4/5 = 5/6 = 6/7 = ...

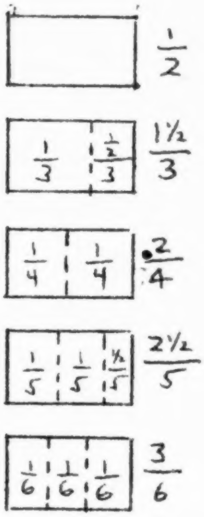
*c. 2/3 = 4/6 = 6/9 = 8/12 = 10/15 = ...

d. 2/3 = 4/6 = 6/8 = 8/10 = 10/12 = ...

e. 2/3 = 2/4 = 2/5 = 2/6 = 2/7 = ...

THE STUDENT CAN DEMONSTRATE A COMPREHENSION OF THE NUMBER CONCEPT AS IT RELATES TO EQUIVALENT FRACTIONS BY CHOOSING THE CORRECT CRITERIA THAT ESTABLISHES EQUIVALENCY FROM A LIST OF PLAUSIBLE ALTERNATIVES. (1) 0450

1. Select the statement which best describes the quantities depicted. 1730


$\frac{1}{2}$
$\frac{1}{3}$ $\frac{1/2}{3}$ $\frac{1\frac{1}{2}}{3}$
$\frac{1}{4}$ $\frac{1}{4}$ $\frac{2}{4}$
$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1/2}{5}$ $\frac{2\frac{1}{2}}{5}$
$\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{3}{6}$

a. They are equivalent because each fraction has a denominator one greater than the one before

b. They are not equivalent because the numerators are different.

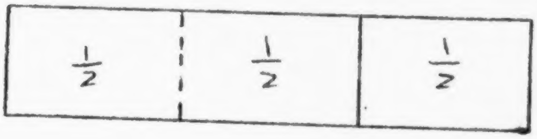
*c. They are equivalent because they all represent the same quantity.

d. They are not equivalent because you cannot have fractions in the numerator of a fraction.

THE STUDENT CAN SHOW A COMPREHENSION OF THE CONCEPT OF EQUIVALENT FRACTION BY CHOOSING THE BEST SUBDIVISION OF A GIVEN SAMPLE INTO SAMPLE FRACTIONAL PARTS FOR FINDING A CERTAIN PART OF THE SAMPLE. (1) 0456

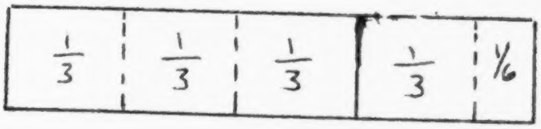
1. Choose the subdivision of $1\frac{1}{2}$ rectangles that would be the most useful for finding $\frac{1}{2}$ of $1\frac{1}{2}$ rectangles. 1741

a.



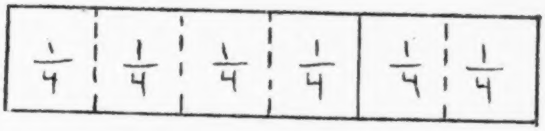
$\frac{1}{2}$
$\frac{1}{2}$
$\frac{1}{2}$

b.



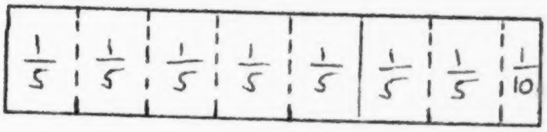
$\frac{1}{3}$
$\frac{1}{3}$
$\frac{1}{3}$
$\frac{1}{3}$
$\frac{1}{6}$

*c.



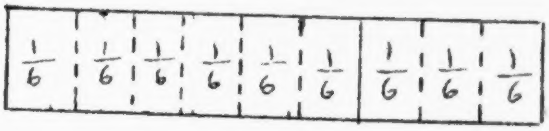
$\frac{1}{4}$
$\frac{1}{4}$
$\frac{1}{4}$
$\frac{1}{4}$
$\frac{1}{4}$
$\frac{1}{4}$

d.



$\frac{1}{5}$
$\frac{1}{5}$
$\frac{1}{5}$
$\frac{1}{5}$
$\frac{1}{5}$
$\frac{1}{5}$
$\frac{1}{5}$
$\frac{1}{10}$

e.



$\frac{1}{6}$
$\frac{1}{6}$
$\frac{1}{6}$
$\frac{1}{6}$
$\frac{1}{6}$
$\frac{1}{6}$
$\frac{1}{6}$
$\frac{1}{6}$
$\frac{1}{6}$

GIVEN A FRACTION NOT REDUCED TO LOWEST TERMS, THE STUDENT DEMONSTRATES HIS ABILITY TO REDUCE AN ALGEBRAIC FRACTION INTO LOWEST TERMS BY CHOOSING THE CORRECT REDUCTION FOR EACH FRACTION.(4) 0053

$\frac{m^4 - n^4}{m^2 + n^2}$ reduced to lowest terms is 0078

a. $m^2 + n^2$

b. $\frac{1}{m^2 + n^2}$

c. $\frac{1}{m^2 n^2}$

*d. $m^2 - n^2$

The fraction $\frac{a^2 - 9}{a^2 + 5a + 6}$ reduced to lowest terms is 0079

a. $\frac{a + 3}{a + 2}$

*b. $\frac{a - 3}{a + 2}$

c. $\frac{a + 2}{a - 3}$

d. $\frac{a + 3}{a - 2}$

$\frac{5st^2}{30st}$ reduced to lowest terms is 0080

a. $\frac{st}{30}$

b. $\frac{t^2}{6\,t}$

*c. $\frac{t}{6}$

d. $\frac{5s}{30t}$

The fraction $\frac{x^2 + xy}{x^2 - xy}$ reduced to lowest terms is 0081

*a. $\frac{x + y}{x - y}$

b. $\frac{xy}{-xy}$

c. $\frac{x - y}{x + y}$

d. $\frac{x\,(x + y)}{x\,(x - y)}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECALL THE RULE FOR DETERMINING EQUIVALENT FRACTIONS BY DECIDING WHICH FRACTIONS ARE EQUIVALENT. (5) 0488

1. Which one of the following fractions is not equivalent to 7/12 ? 1807

A. 14/24
b. 42/72
c. 63/108
*d. 49/144
e. 28/48

2. Which one of the following fractions is not equivalent to 18/24 ? 1808

a. 6/8
*b. 12/15
c. 9/12
d. 3/4

3. Which one of the following pairs of fractions is not equivalent ? 1809

a. 5/6, 15/18
b. 6/16, 15/40
*c. 11/12, 121/144
d. 64/24, 16/6

4. Which one of the following pairs of fractions is not equivalent ? 1810

a. $\frac{7 \cdot 5}{8 \cdot 5}, \frac{7}{8}$

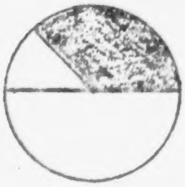
*b. $\frac{7-5}{8-5}, \frac{7}{8}$

c. $\frac{12 \div 3}{15 \div 3}, \frac{12}{15}$

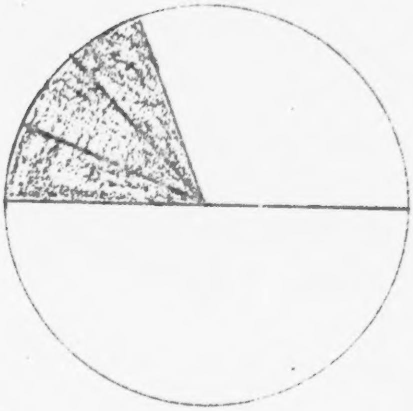
d. $\frac{12 \div 3}{15 \div 3}, \frac{4}{5}$

5. Which one of the following does not represent 3/8 of 1 ? 1811

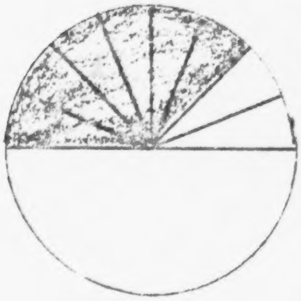
a.



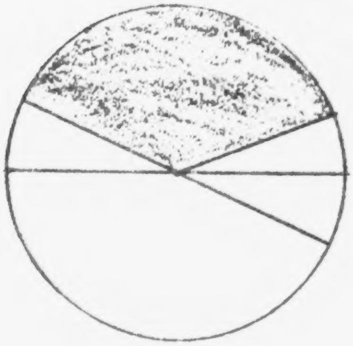
*b.



c.



d.



THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECALL THE PROCESS FOR SIMPLIFYING A FRACTION BY CONCLUDING WHAT STATEMENTS ARE EQUIVALENT TO A GIVEN STATEMENT. (3) 0487

1. The prime factorization of 24/60 is__________________. 1804

*a. $\frac{2\cdot2\cdot2\cdot3}{2\cdot2\cdot3\cdot5}$

b. $\frac{2\cdot2\cdot2}{2\cdot2\cdot2\cdot3}$

c. $\frac{2\cdot4}{6\cdot0}$

d. $\frac{2+2+2+3}{2+2+3+5}$

e. $\frac{2+2+2}{3+2}$

2. An expression that is not equivalent to $\frac{2\cdot2\cdot2\cdot3\cdot5}{2\cdot2\cdot3\cdot7}$ is ________. 1805

a. (12/12) (10/7)

b. $\frac{2\cdot2\cdot3}{2\cdot2\cdot3} \cdot \frac{2\cdot5}{7}$

c. $1 \cdot \frac{5\cdot2}{7}$

*d. $\frac{4}{4} \cdot \frac{2\cdot3\cdot5}{2\cdot3\cdot7}$

3. Which one of the following is equivalent to $1 \cdot \frac{2\cdot3}{7}$? 1806

a. 5/7
*b. 6/7
c. 3/5
d. $\frac{6+1}{7+1}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECALL THE METHOD FOR SIMPLIFYING FRACTIONS BY DECIDING WHICH OF FOUR FRACTIONS IS NOT SIMPLIFIED CORRECTLY. (1) 0493

1. This is a mathematically incorrect and improper method of simplifying fractions. However it sometimes results in a correct answer as seen by the examples. 1830

Ex.: $\frac{2\cancel{6}}{\cancel{6}5} = \frac{2}{5}$ $\frac{1\cancel{6}}{\cancel{6}4} = \frac{1}{4}$ $\frac{4\cancel{12}}{7\cancel{21}} = \frac{4}{7}$

Which one of the following problems does not result in an equivalent fraction when this "trick" method is used?

a. $\frac{2\cancel{2}}{1\cancel{2}1} = \frac{2}{11}$

b. $\frac{1\cancel{9}}{\cancel{9}5} = \frac{1}{5}$

*c. $\frac{1\cancel{6}}{\cancel{6}3} = \frac{1}{3}$

d. $\frac{4\cancel{9}}{\cancel{9}8} = \frac{4}{8} = \frac{1}{2}$

THE STUDENT CAN SHOW HIS UNDERSTANDING OF HOW TO RATIONALIZE THE DENOMINATOR OF A FRACTION BY IDENTIFYING THE RATIONALIZED FORM OF A GIVEN FRACTION. (2) 0384

1. Rationalize the denominator of the fraction 1523

$$3 \quad \frac{4}{\sqrt{2} - \sqrt{3}}$$

a. $\frac{3\sqrt{2} - \sqrt{3}}{5}$ *d. $\frac{12\sqrt{2} + 4\sqrt{3}}{15}$

b. 1/5

c. $\frac{3\sqrt{2} + \sqrt{3}}{7}$

2. Rationalize the denominator of the fraction 1524

$$\frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} + \sqrt{5}}$$

a. 0

*b. $6 - \sqrt{35}$

c. $\frac{6 - \sqrt{35}}{6}$

d. $1 - \sqrt{35}$.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECALL THE ORDERING PRINCIPLE BY CHOOSING THE *LARGEST* FRACTION FROM A GROUP OF FIVE FRACTIONS. (4) 0466

1. Determine which of the five fractions listed below has the greatest value. 1761

a. $\frac{1}{7}$

b. $\frac{1}{6}$

c. $\frac{1}{5}$

d. $\frac{1}{4}$

*e. $\frac{1}{3}$

Determine which of the five fractions listed below has the greatest value. 1762

*a. $\frac{7}{9}$

b. $\frac{5}{9}$

c. $\frac{4}{9}$

d. $\frac{2}{9}$

e. $\frac{1}{9}$

3. Determine which of the five fractions listed below has the greatest value. 1763

a. $\frac{5}{9}$

*b. $\frac{2}{3}$

c. $\frac{5}{8}$

d. $\frac{4}{7}$

e. $\frac{3}{5}$

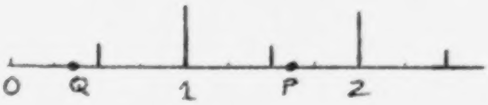
4. Determine which of the three fractions listed below has the greatest value. 1764

a. $\frac{5}{12}$

b. $\frac{3}{10}$

*c. $\frac{7}{16}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO COMPREHEND THE SIZE OF A FRACTION BY ESTIMATING A GIVEN FRACTION'S SIZE AND/OR ITS RELATIONSHIP TO A SECOND GIVEN FRACTION. (7) 0491



Directions:

Using the above graph with the points p and q on the graph, classify each statement below in terms of this key:

a. statement is definitely true.
b. information given is not sufficient to determine whether statement is true or false.
c. statement is definitely false.

1. $p > \frac{3}{2}$ 1821

*a.
b.
c.

2. $p - q > 1$ 1822

*a.
b.
c.

3. $p + q > 2$ 1823

a.
*b.
c.

4. $\frac{p}{q} < 2$ 1824

a.
b.
*c.

5. $p \cdot q > 2$ 1825

a.
b.
*c.

6. $q > \frac{2}{8}$ and $q < \frac{4}{8}$ 1826

*a.
b.
c.

7. $p > 1\frac{1}{2}$ and $p < 1\frac{9}{16}$ 1827

a.
*b.
c.

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF THE CONCEPT THAT A FRACTION IS UNDEFINED WHEN THE VALUE OF DENOMINATOR IS ZERO BY SELECTING FROM A GROUP OF FOUR POSSIBILITIES THE VALUES OF THE VARIABLES FOR WHICH THE FRACTION IS NOT DEFINED. (3) 0052

In the fraction $\frac{3x - 6 + ax - 2a}{x - 2}$ the set of excluded values of the variable x is 0075

a. $x = \{2, -2\}$
*b. $x = \{2\}$
c. $x = \{\ \}$
d. $x = \{0\}$

$\frac{9d - 18}{d^2 + 9d + 14}$ is an undefined fraction when the variable "d" has what value or values? 0076

*a. $d = \{-2, -7\}$
b. $d = \{2, 7\}$
c. $d = \{-2, 7\}$
e. $d = \{2, -7\}$

Under what conditions for "r" and "s" is the fraction 0077

$$\frac{rs}{r^2 - 2rs + s^2}$$ undefined?

a. $r - s \neq 0, \; r + s \neq 0$

b. $r = 0 \quad , \; s \neq 0$

c. $r \neq 0 \quad , \; s = 0$

*d. $r - s = 0, \; r = s$

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF THE CONCEPT THAT A FRACTION CANNOT HAVE A VALUE OF ZERO IN THE DENOMINATOR BY CHOOSING THE CORRECT SOLUTION SET FOR WHICH A GIVEN FRACTION IS UNDEFINED. (3) 0091

Select the solution set for T in the fraction $\frac{12T}{T^2 + 1}$ for which the fraction is undefined. 0216

*a. $\{ \}$

b. $T = \{0\}$

c. $T = \{-1\}$

d. $T = \{\frac{1}{2}\}$

For what value of c is the fraction $\frac{c - 1}{3c^3 - 9c^2 - 30c}$ undefined? 0217

a. $c = \{0, -5, -2\}$
*b. $c = \{0, 5 -2\}$
c. $c = \{-5, -2, 2\}$
d. $c = \{0, 5 2\}$

For what value of k is the fraction $\frac{5}{7k + 14}$ undefined? 0218

a. $k = \{2\}$
b. $k = \{14\}$
*c. $k = \{-2\}$
d. $k = \{0\}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE A PRACTICAL FRACTION PROBLEM BY DECIDING WHAT INFORMATION IS RELEVANT OR NOT RELEVANT TO THE SOLUTION OF THE PROBLEM. (2) 0476

1. In the problem below, decide what part is unnecessary in order to solve the problem. 1780

"A family plans to spend ¼ of its annual income of $6,600 for shelter, 1/3 for food and clothing, 1/6 for general expenses and 3/20 for miscellaneous expenses. What fractional part is left for savings?"

a. ¼ for shelter
*b. $6,600 annual income
c. 1/3 for food and clothing
d. 1/6 for general expenses
e. 3/20 for miscellaneous expenses

2. In the problem below, decide what further information is needed in order to solve the problem. 1781

"A family plans to spend ¼ of it's annual income for shelter, 1/3 for food and clothing, 1/6 for general expenses and 3/20 for miscellaneous expenses. The money that is left will be saved. How much money do they plan to save each year?"

a. the fractional part of the annual income to be saved
*b. the actual annual income
c. the number of people in the family
d. the fractional part of the annual income to be spent on doctor bills

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE HYPOTHETICAL STATEMENTS INVOLVING FRACTIONS BY COMPUTING AN ANSWER IN A NEW SITUATION. (2) 0492

1. If ¼ of 20 is not 5 but 4, then $\frac{1}{3}$ of 10 is__________. 1828

a. $4\frac{1}{3}$

b. 3

c. $33\frac{1}{3}$

*d. $2\frac{2}{3}$

2. If ½ of 5 were 3, what would $\frac{1}{3}$ of 10 be? 1829

a. 2

*b. 4
c. 6
d. $4\frac{1}{6}$

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF LOWEST COMMON DENOMINATOR BY FINDING THE L.C.D. OF TWO OR MORE FRACTIONS. (4) 0630

1. Find the L.C.D. of $\frac{5R + 2}{4R - 8} - \frac{2R + 5}{R^2 - R - 2}$ 2456

a. $(4R - 8)\ (R^2 - R - 2)$

*b. $4(R - 2)\ (R + 1)$

c. $4(R - 2)^2\ (R + 1)$

d. $(4R - 8)\ (R - 2)\ (R + 1)$

2. Find the L.C.D. of $\frac{4}{a^2 + ab} + \frac{3}{ab + b^2}$ 2457

a. $(a^2 + ab)\ (ab + b^2)$

b. $a(a + b)\ b\ (a + b)$

*c. $ab\ (a + b)$

d. $a^2 + ab + b^2$

3. If the L.C.D. of two fractions is $3(R + 2)\ (R + 3)$ and one fraction is $\frac{4R + 1}{3R + 6}$, which of the following could be the second fraction. 2458

a. $\frac{2R - 5}{4R + 12}$

*b. $\frac{2R - 5}{3R + 9}$

c. $\frac{2R - 5}{3(R + 2)}$

d. $\frac{2R - 5}{(R + 2) - (R + 3)}$

4. If the L.C.D. of two fractions is $4(A-2)\ (A-1)$ and one fraction is $\frac{2A + 1}{2A - 2}$, which of the following could be the second fraction. 2459

a. $\frac{3A + 2}{2(A - 2)}$

b. $\frac{3A + 2}{2(A - 2)\ (A - 1)}$

*c. $\frac{3A + 2}{4(A - 2)}$

d. $\frac{3A + 2}{4(A - 1)}$

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF RENAMING FRACTIONS AND DECIMALS AS PER CENTS AND CONVERSELY BY SELECTING THE ALTERNATIVE FORM WHEN GIVEN THE ORIGINAL. (4) 0028

.634 renamed as percent is 1465

a. 634 %
b. 6.34 %
*c. 63.4 %
d. .634 %

$\frac{378}{100}$ renamed as percent is 1466

*a. 378 %
b. 3.78 %
c. 37.8 %
d. .378 %

84 % could be renamed 1467

a. 8.4

b. $\frac{84}{1000}$

c. .084

*d. $\frac{21}{25}$

.015 can be renamed 1468

*a. $\frac{3}{200}$

b. 15 %

c. $\frac{15}{100}$

d. .15 %

THE STUDENT DEMONSTRATES HIS ABILITY TO CONVERT (A) A COMMON FRACTION TO A REPEATING DECIMAL AND (B) A REPEATING DECIMAL TO A COMMON FRACTION BY CHOOSING THE CORRECT ALTERNATIVE FORM. (4) 0076

$\frac{52}{70}$ expressed as a terminating or repeating decimal is: 0153

a. $.71875$

*c. $.7\overline{428571}$

b. $.\overline{685714}$

d. $.64872$

$\frac{3}{50}$ expressed as a repeating or terminating decimal is: 0154

a. $.\overline{0257}$

c. $.\overline{380952}$

*b. $.06000$

d. $.3261$

.272727...expressed as a common fraction is: 0155

a. $\frac{2}{12}$

*c. $\frac{3}{11}$

b. $\frac{4}{11}$

d. $\frac{1}{8}$

$.3\overline{37}$ expressed as a common fraction is: 0156

*a. $\frac{76}{225}$

c. $\frac{11}{35}$

b. $\frac{81}{200}$

d. $\frac{18}{59}$

STUDENTS SHOULD BE ABLE TO CHANGE EITHER REPEATING OR TERMINATING DECIMALS TO FRACTIONS AND DEMONSTRATE THIS BY CHOOSING THE CORRECT FRACTION FOR A GIVEN DECIMAL. (5) 0186

The decimal $.\overline{27}$ expressed as a fraction is 0632

a. 25/99
*b. 3/11
c. 27/100
d. 27/10
e. None of above

The decimal .38 expressed as a fraction is 0633

a. 7/20
b. 38/99
c. 35/99
*d. 19/50
e. none of above

The decimal $.\overline{45}$ expressed as a fraction is 0634

a. 45/99
*b. 41/90
c. 9/20
d. 45/1000
e. none of above

The decimal $1.\overline{732}$ expressed as a fraction is 4200635

a. 1732/99
b. 1732/999
*c. 1731/999
d. 1732/1000
e. none of above

The decimal $16.\overline{6}$ expressed as a fraction is 0636

a. 166/9
b. 166/99
*c. 50/3
d. 83/5
e. none of above

THE STUDENT CAN CHOOSE THE FRACTIONAL EQUIVALENT OF A REPEATING DECIMAL, DEMONMSTRATING UNDERSTANDING OF ALTERNATE FORMS. (3) 0232

The fractional equivalent in lowest terms $.\overline{42}$ is... 1174

a. $\frac{42}{99}$

b. $\frac{42}{100}$

c. $\frac{21}{50}$

*d. $\frac{14}{33}$

The power of ten by which we'd multiply $5.2\overline{35}$ to find its fractional equivalent is... 1175

a. 1
*b. 2
c. 3
d. any integer

The power of ten by which we'd multiply $63.2\overline{5}$ to find its fractional equivalent is... 1176

a. 1
b. 2
c. 4
*d. any integer

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO TRANSLATE THE DECIMAL EQUIVALENT TO A RATIONAL NUMBER BY CHOOSING THE CORRECT ALTERNATE FORM. (4) 0214

The decimal equivalent for $\frac{4}{7}$ is 1113

a. $.\overline{5714285}$
b. 1.75
c. $1.75\overline{0}$
*d. $.\overline{571428}$
e. none of the above

$.1\overline{6}$ is the decimal equivalent of the rational number 1114

a. $\frac{2}{3}$

*b. $\frac{1}{6}$

c. $\frac{16}{100}$

d. $\frac{1}{7}$

e. none of the above

The decimal equivalent for $\frac{2}{5}$ is 1115

a. 2.5
b. 4
*c. $.\underline{4}$
d. .4
e. none of the above

If we find the decimal equivalent of $\frac{1}{11}$ by long division the number of possible remainders we may encounter is 1116

*a. 10
b. 1
c. 11
d. indeterminable
e. none of the above

THE STUDENT CAN DEMONSTRATE AN UNDERSTANDING OF THE MEANING OF A DECIMAL NUMERAL BY CHOOSING THE CORRECT FRACTION NUMERAL THAT EQUALS A PARTICULAR DECIMAL VALUE. (2) 0457

1. Choose the expression which equals 607.3 1744

a. $\frac{600}{1} + \frac{73}{1}$

b. $\frac{60}{10} + \frac{73}{10}$

*c. $\frac{6000}{10} + \frac{70}{10} + \frac{3}{10}$

d. $\frac{6}{100} + \frac{7}{1} + \frac{3}{10}$

e. $\frac{600}{10} + \frac{7}{1} + \frac{3}{10}$

2. Choose the expression which equals 41.8 1745

*a. $\frac{41}{1} + \frac{8}{10}$

b. $\frac{41}{100} + \frac{8}{10}$

c. $\frac{4}{10} + \frac{1}{1} + \frac{8}{10}$

d. $\frac{40}{10} + \frac{1}{1} + \frac{8}{10}$

e. $\frac{41}{10} + \frac{8}{10}$

THE STUDENT SHOWS HIS UNDERSTANDING OF PERCENT BY SELECTING THE CORRECT SOLUTION FOR A PROBLEM INVOLVING PERCENT. (4) 0030

40% of 62 is 1470

a. 248
b. 15.5
c. 155
*d. 24.8

30 is 15% of 1471

a. 45
b. 4.5
*c. 200
d. 2000

65 is______% of 20 1472

*a. 325
b. 30.79
c. 3.25
d. 32.5

16% of 25 is the same as 1473

a. 13% of 30
b. 6% of 70
c. 150% of 3
*d. 8% of 50

THE STUDENT CAN SHOW A KNOWLEDGE OF THE PROCESS OF FINDING WHAT PERCENT ONE VALUE IS OF ANOTHER BY SELECTING THE CORRECT ANSWER TO A PARTICULAR PROBLEM FROM A LIST OF PLAUSIBLE ALTERNATIVES.(2) 0460

1. Select the best answer to the problem, "126 is what percent of 840?" 1750

*a. 15%
b. 66%
c. 33%
d. 11%
e. 22%

2. Select the best answer to the problem, "4 is what percent of 28?" 1751

a. 77%
b. 17%
*c. 14%
d. 70%
e. 20%

THE STUDENT CAN SHOW A KNOWLEDGE OF THE PROCESS OF FINDING A CERTAIN PERCENTAGE OF A GIVEN VALUE BY SELECTING THE CORRECT PERCENTAGE FROM A LIST OF PLAUSIBLE ALTERNATIVES. (2) 0461

1. Select the correct answer to the problem: Find 23% of $70. 1752

a. $1610
b. $93
c. 1610%
d. $9.30
*e. $16.10

2. Select the correct answer to the problem: Find 160% of 25 pounds. 17

a. 4 pounds.
*b. 40 pounds.
c. 400 pounds.
d. 4000 pounds.
e. .4 pounds.

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF THE PROCESS OF FINDING THE 100 PERCENT VALUE GIVEN A NUMBER AND WHAT PERCENT OF THE TOTAL THAT IT IS BY SELECTING THE CORRECT ANSWER TO A PARTICULAR PROBLEM FROM A LIST OF PLAUSIBLE ALTERNATIVES. (2) 0462

1. Select the best answer to the problem, "162 is 18% of what number?" 1754

a. 29
b. 1111
c. 290
*d. 900
e. 640

2. Select the best answer to the problem, "24.5 is 35% of what number?" 1755

a. 85
*b. 70
c. 60
d. 8.5
e. 140

THE STUDENT CAN DEMONSTRATE AN UNDERSTANDING OF THE MEANING OF A DECIMAL NUMERAL BY CHOOSING THE NUMERAL WHICH DOES *NOT* EQUAL THE GIVEN ONE. (2) 0455

1. Select the numeral that does not equal .23. 1739

a. 23/100
b. 230/1000
c. .23/1
d. 2.3/10
*e. 2300/1000

2. Select the numeral that does not equal 8.37. 1740

a. 83.7/10
*b. .837/100
c. 8370/1000
d. 8.37/1
e. .837/.1

THE STUDENT CAN SHOW AN UNDERSTANDING OF THE EFFECT OF MULTIPLYING A DECIMAL NUMERAL BY A POWER OF TEN BY SELECTING THE CORRECT ANSWER TO A PROBLEM OF THIS TYPE. (2) 0458

1. $23.64 \times \frac{1}{100} =$ 1746

a. 2364
b. 236.4
c. 23640
d. .02364
*e. .2364

2. .8614 x 1000 = ? 1747

a. 8614
b. 8.614
c. 0008614
*d. 861.4
e. .008614

THE STUDENT CAN DEMONSTRATE AN UNDERSTANDING OF THE RELATIONSHIP OF PLACES TO EACH OTHER IN A DECIMAL NUMERAL BY CHOOSING THE CORRECT EXPRESSION WHICH EQUALS A GIVEN ONE. (2) 0459

1. Which expression is equal to 40 x 10 + 72 x 1 + 38 x $\frac{1}{100}$? 1748

a. 47 x 10 + 23 x 1 + 8 x $\frac{1}{100}$

*b. 4 x 100 + 7 x 10 + 2 x 1 + 3 x $\frac{1}{10}$ + 8 x $\frac{1}{100}$

c. 4 x 100 + 73 x 1 + 8 x $\frac{1}{100}$.

d. 11 x 10 + 2 x 1 + 3 x $\frac{1}{10}$ + 8 x $\frac{1}{100}$

e. 1 x 100 + 1 x 10 + 2 x 1 + 3 x $\frac{1}{10}$ + 8 x $\frac{1}{100}$.

2. Which expression is equal to 632 x $\frac{1}{10}$ + 21 x $\frac{1}{100}$? 1749

a. 6 x 1 + 5 x $\frac{1}{10}$ + 3 x $\frac{1}{100}$

b. 6 x 10 + 5 x 1 + 4 x $\frac{1}{10}$ + 1 x $\frac{1}{100}$

c. 6 x 100 + 3 x 10 + 4 x 1 + 2 x $\frac{1}{10}$ + 1 x $\frac{1}{100}$

*d. 6 x 10 + 3 x 1 + 4 x $\frac{1}{10}$ + 1 x $\frac{1}{100}$

e. 6 x 100 + 3 x 10 + 4 x 1 + 2 x $\frac{1}{10}$ + 1 x $\frac{1}{100}$

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF ALTERNATION, INVERSION AND CROSS-PRODUCT BY SELECTING THE RESULT OF ONE OF THESE OPERATIONS ON GIVEN PROPORTIONS. (2) 0025

Given the proportion $\frac{a}{b} = \frac{c}{d}$.

What method would you use to change the given proportion to $\frac{a}{c} = \frac{b}{d}$ 1459

*a. alternation
b. inversion
c. cross-product property
d. means

If the proportion $\frac{e}{f} = \frac{g}{h}$ is changed by inversion the result would be 1460

a. $\frac{e}{g} = \frac{f}{h}$

b. $e \cdot h = f \cdot g$

*c. $\frac{f}{e} = \frac{h}{g}$

d. $\frac{g}{f} = \frac{e}{h}$

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF THE TERMINOLOGY ASSOCIATED WITH RATIOS AND PROPORTIONS CHOOSING THE CORRECT TERM FOR A GIVEN DESCRIPTION. (2) 0026

The means of a proportion are the ________terms. 1461

a. 1st and 3rd
b. 2nd and 4th
c. 1st and 4th
*d. 2nd and 3rd

The third term of the proportion $\frac{e}{f} = \frac{g}{h}$ is 1462

a. f
*b. g
c. h
d. e

THE STUDENT DEMONSTRATES AN UNDERSTANDING OF RATIO BY SELECTING THE APPROPRIATE RATIO WHICH REPRESENTS A GIVEN SITUATION (3) 0054

The ratio, in lowest terms, of the area of an 8 by 12 inch rectangel to that of one 4 by 36 inches is 0082

*a. $\frac{2}{3}$

b. $\frac{96}{144}$

c. $\frac{4}{36}$

d. $\frac{1}{3}$

Two numbers, whose difference is 56, are in the ratio of 2 to 5. What are the two numbers? 0083

*a..37 1/3 and 93 1/3

b. 16 2/3 and 40 2/3

c. 77 1/7 and 21 2/7

d. 82 3/5 and 26 2/5

Rice contains only 5 per cent fat. How much rice would you have to eat to consume a quarter of a pound of fat? 0084

a. 3 lbs.
b. 1/3 lb.
c. 1/5 lb.
*d. 5 lbs.

THE STUDENT WILL BE ABLE TO APPLY THE CONCEPT OF FRACTIONAL PARTS AND RATIO BY TRANSLATING PROBLEMS INTO APPROPRIATE ALGEBRAIC EXPRESSIONS. (10) 0322

1. A boy can paint a fence in 9 hours. What part of the fence can he paint in h hours? 868

a. $\frac{9}{h}$

b. 9h

*c. $\frac{h}{9}$

d. none of these

2. Tom has 9 hits out of 30 times at bat. The ratio of hits to at bats is 869

a. $\frac{9}{30}$

b. $\frac{3}{10}$

c. $\frac{21}{30}$

*d. a and b

3. A man drives 6 miles in t hours. His rate is 870

a. 6t

b. $\frac{t}{6}$

*c. $\frac{6}{t}$

d. none of these

4. If the areas of two triangles have the ratio two to five, then which of the following sets are equivalent to this ratio? 871

a. $\frac{10}{25}$, $\frac{12}{27}$, $\frac{14}{29}$, $\frac{16}{31}$ ...

b. $\frac{2}{5}$, $\frac{3}{6}$, $\frac{4}{7}$, $\frac{5}{8}$, $\frac{6}{9}$ ...

*c. $\frac{4}{10}$, $\frac{6}{15}$, $\frac{8}{20}$, $\frac{10}{25}$ ...

d. none of these

5. If Charlie can mow his lawn in 6 hours, how much of the lawn will be left to mow after he has worked for 4 hours. 872

a. $\frac{4}{6}$

b. $\frac{2}{3}$

c. $\frac{1}{2}$

*d. $\frac{1}{3}$

6. Sally is twice Sam's age increased by 8. The ratio of Sally's age to Sam's age is 873

*a. $\frac{2x + 8}{x}$

b. $\frac{x}{2(x + 8)}$

c. $\frac{x}{2x + 8}$

d. $\frac{2(x + 8)}{x}$

7. If given that a = b, then the ratio of a to b is 874

a. $\frac{b}{a}$

b. 0

*c. 1

d. none of these

8. 35% can be expressed as a ratio. This ratio is 875

a. $\frac{35}{100}$

b. $\frac{7}{20}$

c. $\frac{70}{200}$

*d. all of these

9. If a suit is on sale and selling for $\frac{1}{3}$ off the list price and you pay $40 for the suit, then $40 represents 876

a. $\frac{1}{3}$ of the list price

*b. $\frac{2}{3}$ of the list price

c. $\frac{1}{3}$ of the sale price

d. $\frac{2}{3}$ of the sale price

10. The Browns wish to increase the size of their swimming pool by $\frac{2}{5}$ of the original size. Which of the following would they do ? 877

a. take $\frac{2}{5}$ of the length plus $\frac{2}{5}$ of the width.

b. take $\frac{2}{5}$ of the length times $\frac{2}{5}$ of the width.

*c. take $\frac{2}{5}$ of the area.

d. take $\frac{3}{5}$ of the area.

FUNCTIONS AND RELATIONS

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF THE RANGE AND DOMAIN OF A FUNCTION BY SELECTING THE CORRECT RANGE AND DOMAIN FOR EACH SET. (3) 0083

Which of the following sets would be the correct range given the relation $y = x^2 - 2x$ and the domain $\{-2, -1, 0, 1, 2\}$? 0180

a. $\{-1, 8, 3, 0, 2\}$

b. $\{3, 0, -2, 1, 4\}$

*c. $\{8, 3, 0, -1, 0\}$

d. $\{0, 3, 0, -1, 2\}$

Which of the following sets would represent the correct domain given the relation $y = 2x$ and the range $\{2, 4, 8, -2\}$? 0181

a. $\{2, 4, 3, 8\}$

*b. $\{1, 2, 4, -1\}$

c. $\{0, 1, 2, -1\}$

d. $\{4, 3, 8, 0\}$

Given the relation $y = \frac{1}{2x - 1}$, the domain of the relation is: 0182

*a. $\{x \mid x \neq \frac{1}{2}\}$ c. $\{x \mid x \neq 0\}$

b. $\{x \mid x \neq -\frac{1}{2}\}$ d. $\{x \mid x \neq 1\}$

GIVEN A VALUE IN THE DOMAIN, THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE VALUE OF THE RANGE BY SELECTING THE CORRECT RANGE VALUE. (2) 0099

If $f(x) = 3x^2 - 2x + 4$, $f(3) =$ 0244

a. 31
b. 24
c. 37
*d. 25

If $f(x) = 2x + 3$ and $g(x) = 6x - 2$ find $f(2) + g(2)$ 0245

a. 12
b. 10
c. 7
*d. 17

THE STUDENT WILL BE ABLE TO APPLY THE DEFINITIONS ASSOCIATED WITH FUNCTION TO DETERMINE IMAGE VALUES, DOMAIN, AND RANGE OF FUNCTIONS OF REAL NUMBERS. (10) 0254

If f (x) = x^2 + 9, then f (-3) = ____________ 0929

a. 0
b. 9
*c. 18
d. 27
e. none of above

If y - 3x - 7 = 0, then in the ordered pair (9,b), b = _______ 0930

*a. 34
b. -34
c. -2/3
d. 2/3
e. none of the above

If f (x) = 2x where x is a real number, then the range of the function is all_________ 0931

a. real numbers
b. positive real numbers
c. positive even real numbers
*d. even real numbers
e. negative real numbers

A function is such that each element in the domain is five more than its image; then f (x) = __________ 0932

a. x + 5
*b. x - 5
c. 5 - x
d. 5
e. none of the above

If y = $2x^2$ + 3x, then in the ordered pair (-5, y), y = ______ 0933

a. 10
b. 65
c. 50
*d. 35
e. none of the above

If a spherical region has radius of length 5, then the surface area of the sphere is__________ 0934

*a. 100π
b. $\frac{500}{3}\pi$
c. 25π
d. 400π
e. none of the above

Given: $f(x) = x^3 + 1$, find the element or elements in the domain associated with an image value of 9. 0935

a. 9
b. 8
c. 3
d. -2
*e. none of the above

Given $f(x) = 2x + 1$, $g(y) = 2y - 1$ then $f(g(2)) =$_______ 0936

a. 5
*b. 7
c. 9
d. 11
e. none of the above

If $f(x) = 2x + 1$, then the set in the domain with image 5 is ________. 0937

*a. (2, -3)
b. (2, -2)
c. 2
d. -3
e. none of the above

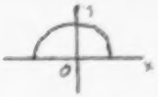
The function $f(x) = \dfrac{1}{x^2 - 1}$ is undefined when x is________ 0938

a. 0
b. 1
c. −1
*d. b and c above
e. none of the above

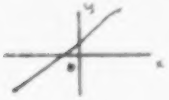
THE STUDENT WILL BE ABLE TO APPLY THE CONCEPTS OF FUNCTIONS AND RELATIONS BY CHOOSING THE DOMAIN RANGE OR GRAPH OF GIVEN FUNCTIONS OR RELATIONS. (3) 0302

Which of the following is not a function? 0467

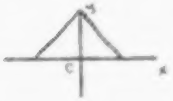
a.



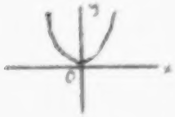
b.



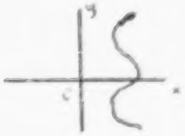
c.



d.



*e.



This is the domain of which function? 0468

{2, 3, 4, 6}

a. {(2,0) (3, 4), (6, 5)}
b. {(2,1), (3, 5), (2, 7), (4, 0), (6, 6)}
*c. {(6, 1), (2, 3), (4, −2), (3, −1)}
d. {(2,2), (3, 3), (4, 3), (0, 6)}

Which of the following relates to this relation? $\{f:x \mid x^2 - 1\}$ 0469

*a. Domain = $\{x: x \geq 1 \text{ or } x \leq -1, x \in R\}$

b. Domain = $\{x: -1 \leq x \leq 1, x \in R\}$

c. Range = $\{y: y > 0, y \in R\}$

d. Range = $\{y: y \in R\}$

THE STUDENT CAN RECALL THE DEFINITION OF EVEN FUNCTION BY SELECTING A CORRECT EXAMPLE. (2) 0291

Which of the following is an even function? 1371

a. sin
*b. cos
c. tan

$f(x) = x^4 - x^2 + 6$ is (a/an) ____________. 1372

a. odd function
*b. even function
c. neither an odd nor an even function

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THE DEFINITIONS OF EVEN AND ODD FUNCTIONS BY DETERMINING IF THE EQUATION OF THE FUNCTION IS ODD, EVEN, BOTH, OR NEITHER. (6) 0523

If $f(-x) = f(x)$ for all x in the domain the function is called an even function.

If $f(-x) = -f(x)$ for all x in the domain the function is called an odd function.

1. The function $f(x) = |x|$ is a(n) 1922

*a. even function
b. odd function
c. even and odd function
d. function which is neither even or odd.

2. The function $f(x) = [x]$ is a(n) 1923

a. even function
b. odd function
c. even and odd function
*d. function which is neither even or odd.

3. The function $f(x) = x^2$ is a(n) 1924

*a. even function
b. odd function
c. even and odd function
d. function which is not even or odd

4. The function $f(x) = \sqrt{25 - x^2}$ is a(n) 1925

*a. even function
b. odd function
c. even and odd function
d. function which is not even or odd

5. The function $f(x) = \frac{1}{x}$ is a(n) 1926

a. even function
*b. odd function
c. even and odd function
d. function which is not even or odd.

6. the function $f(x) = \begin{cases} x \text{ if } x > 3 \\ 2 \text{ if } -3 \leq -x \leq -3 \\ -x \text{ if } x < -3 \end{cases}$ is a(n) 1927

*a. even function
b. odd function
c. even and odd function
d. function which is not even or odd

THE STUDENT APPLIES HIS KNOWLEDGE OF THE FUNDAMENTAL THEOREM OF ALGEBRA BY CHOOSING THE CORRECT ZEROES OF A GIVEN FUNCTION. (3) 0155

Find all the zeros of the polynomial function $x^3 + x^2 + x + 1$ 0435

a. $1, -i, i$

b. $2i, -2i, -1$

*c. $-1, i, -i$

d. $2 + i, 2 - i, 1$

Find all the zeros of the polynomial function $x^4 + 3x^3 - 8x - 24$ 0436

a. $1, -2, 1 - \sqrt{2i}, 1 + \sqrt{2i}$

b. $3, -8, \sqrt{3i}, -\sqrt{3i}$

c. $6, -4, 1 + \sqrt{i}, 1 - \sqrt{i}$

*d. $2, -3, -1 + i\sqrt{3}, -1 - i\sqrt{3}$

Find all the zeros of the polynomial function $x^4 + 4x^3 - 16x - 16$ 0437

*a. $2, -2, -2, -2$

b. $-2, 2, 2, 2$

c. $-4, 4, 4, 4$

d. $8, -8, -8, -8$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO DEVELOP THE NECESSARY PRINCIPLES FOR FINDING AN INVERSE AND ITS GRAPH BY APPLYING THE CONCEPTS OF FUNCTIONS BY CHOOSING THE CORRECT INVERSE OF A GIVEN SET OR FUNCTION. (5) 0306

Directions: The following items are a set leading the student from recognizing statement of a function to his recognition of one statement of an inverse.

Given the definition of a function as $(x,y)\ y = f(x)$
The following are examples of functions and their inverses:

1) $A = \{(1,2), (3,4), (5,6)\}$
   $A^{-1} = \{(2, 1), (4,3), (6,5)\}$
2) $B = \{(10,2), (-3,5)\}$
   $B^{-1} = \{(2, 10), (5, -3)\}$

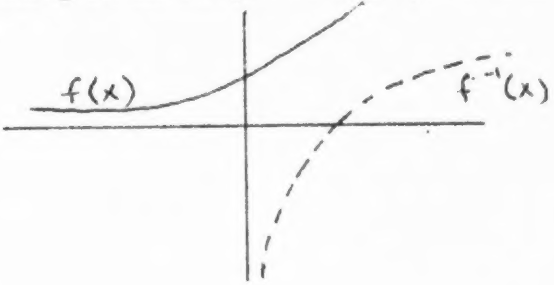
Which of the following is the inverse of set X. 0477
$X = \{(2,3), (a,b), (5,y)\}$

a. $X^{-1} = \{(-2,3), (-a,b), (-5,y)\}$
*b. $X^{-1} = \{(3,2), (b,a), (y, 5)\}$
c. $X^{-1} = \{(3,2), (-b,a), (-y, 5)\}$
d. $X^{-1} = \{(5,y), (a,b), (2,3)\}$

Which of the following represents the inverse of 0478
$A = \{(x,y) \mid y = 2x + 1\}$

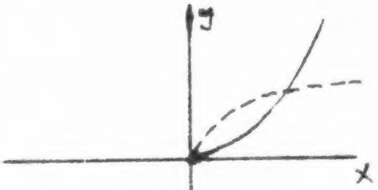
a. $A^{-1} = \{(x,y) \mid x = 2y-1\}$
b. $A^{-1} = \{(x,y) \mid y = \frac{x + 1}{2}\}$
c. $A^{-1} = \{(y,x) \mid y = 2x+1\}$
*d. $A^{-1} = \{(y,x) \mid x = 2y+1\}$

The following is an example of a graph of a function and its inverse.

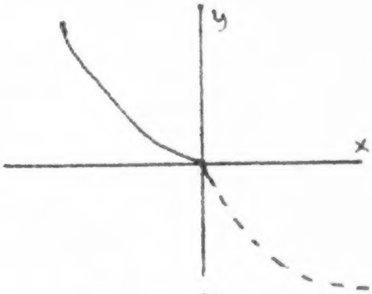


Which of the following does not represent a function and its inverse. 0479

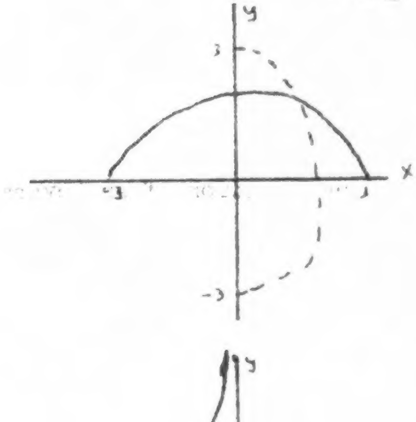
a.



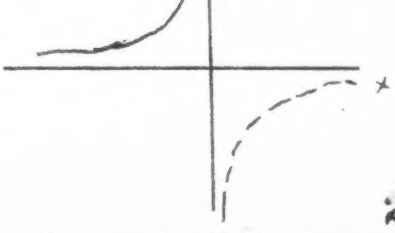
b.



*c.

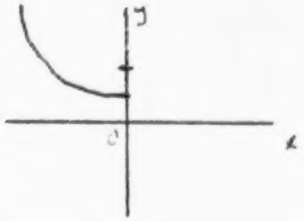


d.

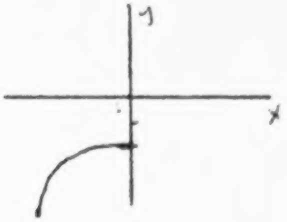


Given the function $x = \sqrt{y-1}$. Which of the following is the graph of its inverse. 0480

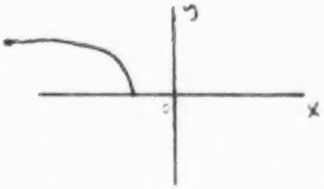
a.



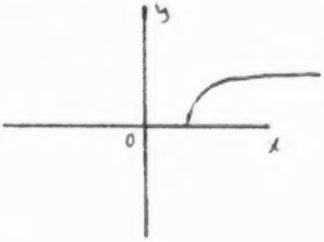
b.



c.



*d.



Which of the following represents the equation of an inverse. 0481

*a. $\{(y,x) \mid x = f^{-1}(y)\}$

b. $\{(y,x) \mid y = f^{-1}(x)\}$

c. $\{(x,y) \mid x = f^{-1}(y)\}$

d. $\{(x,y) \mid y = f^{-1}(x)\}$

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF INVERSE RELATIONS AND INVERSE FUNCTIONS BY IDENTIFYING THE SIMILARITIES OR DIFFERENCES BETWEEN THEM. (2) 0602

1. What is a property common to both $\cos^{-1}x$ and $\mathrm{Cos}^{-1}x$? 2145

*a. They have the same domains
b. They have the same ranges
c. They are both functions
d. They both have the same inverse function

2. What is the property NOT common to both $\mathrm{Sin}^{-1}x$ and $\mathrm{Cos}^{-1}x$?

a. They have the same domains
*b. They have the same ranges
c. They are both functions
d. They both have an inverse function

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY THE CONCEPT OF COMPOSITION OF FUNCTIONS BY USING THE DEFINITION TO FIND THE INVERSE OF A GIVEN FUNCTION. (3) 0518

Given a function $f(x)$ a function $g(x)$ is called the inverse of f if $f \circ g = g \circ f = x$

1. If $f(x) = 3x-1$ then $g(x)$ (the inverse of $f(x)$) is 1914

a. $3x-1$

b. $\frac{x-1}{3}$

*c. $\frac{x+1}{3}$

d. $\frac{1}{3x}-1$

e. none of the above

2. If $f(x) = \frac{x + 1}{2x - 1}$ then $g(x)$ [the inverse of $f(x)$] is 1915

*a. $\frac{x+1}{2x-1}$

b. $\frac{2x-1}{x+1}$

c. $\frac{x-1}{2x+1}$

d. $\frac{2x+1}{x-1}$

e. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF INVERSE FUNCTIONS BY IDENTIFYING THE CONDITIONS NECESSARY TO FORM AN INVERSE FUNCTION. (1) 0597

1. Given the function $y = |x|$ with domain $= \{x : x \in R\}$ and range $= \{y : y \geq 0\}$ what limitations must be assigned to the inverse relation to form a function? 2137

a. assign only negative values to y
b. assign only positive values to y
*c. assign only non-negative values to y
d. assign only non-positive values to y
e. assign only zero to y

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF INVERSES BY PREDICTING WHETHER A FUNCTION HAS AN INVERSE RELATION OR INVERSE FUNCTION. (5) 0616

Directions: Given the following functions mark (A) if it has an inverse relation and (B) if it has an inverse function.

	Relation	Function	
1. $y = 3x + 4$	A	*B	2178
2. $y = /x/$	*A	B	2179
3. $y = \cos x$	*A	B	2180
4. $y = x^2 - 9$	*A	B	2181
5. $y = \text{Cos } x$	A	*B	2182

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECOGNIZE LINEAR FUNCTIONS BY CHOOSING EQUIVALENT EXPRESSIONS. (2) 0305

Which of the following is a linear function? 0475

*a. $4x - 2 = 6x + 12$
b. $y = x+1$
c. $y = x^2 + 2x$
d. $x^2 + y^2 = 9$

Which of the following steps is equivalent to 0476

$$\frac{4(2x + 3)}{5} = \frac{4 + (2x + 3)}{10}$$

a. $8x + 12 = 4 + 2x + 3$

b. $8(2x + 3) = 2(4 + 2x + 3)$

c. $6x = -5$

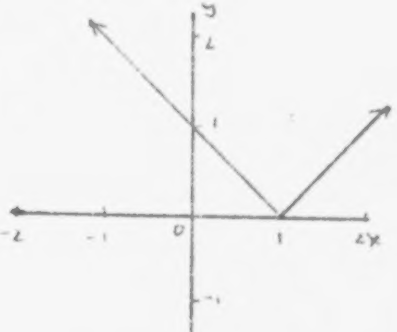
d. $14x = 17$

*e. none of the above

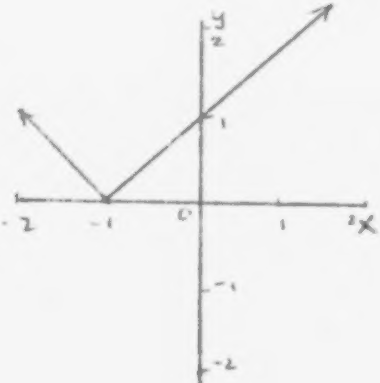
THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS COMPREHENSION OF THE ABSOLUTE VALUE FUNCTION BY IDENTIFYING THE GRAPH OF A FUNCTION.(3) 0530

1. Which of the following is the graph of $y = |X - 1|$? 1940

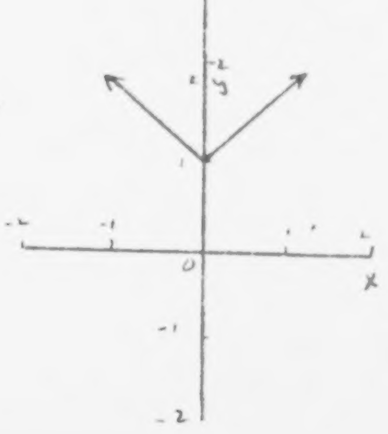
*a.



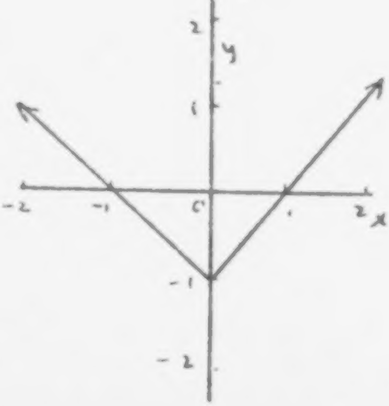
b.



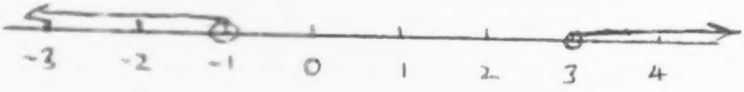
c.



d.



2. The equation for the graph is: 1941



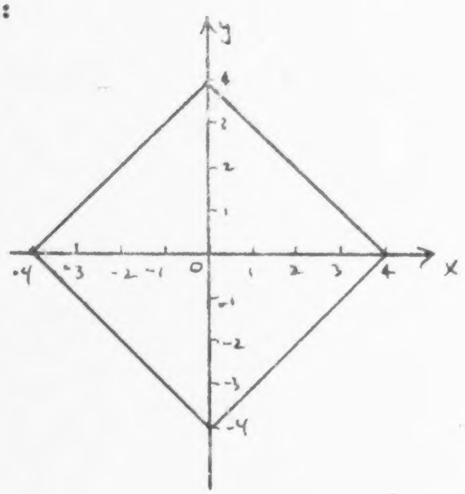
a. $|x| > 3$ or $|x| < -1$

b. $|x - 1| < 2$

c. $|x| - 1 > 2$

*d. $|x - 1| > 2$

3. The equation for the graph: 1942



a. $|x + y| = 4$

b. $|x| - |y| = 4$

c. $|y| - |x| = 4$

d. $|x - y| = 4$

*e. $|x| + |y| = 4$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO ANALYZE THE ROLES OF THE COEFFICIENTS IN AN EQUATION INVOLVING ABSOLUTE VALUES BY IDENTIFYING THE CHANGES THAT OCCUR IN THE GRAPH OF THE EQUATION DUE TO CHANGES IN THE COEFFICIENTS. (7) 0531

Directions: Given the equation $y = |ax + b| + c$ where a, b and c are real numbers and a is positive. Select the correct answers to the problems below.

1. The value for which $y = 0$ depends upon is 1943

a. a only
b. b only
c. c only
d. a and c
*e. a, b and c

2. The graph $y = |ax + b| + c = 0$ intersects the y axis at 1944

a. $b + c$
b. $-b + c$
*c. $\pm b + c$
d. $\pm (b + c)$
e. $\overline{b}/a$

3. If only $c = 0$, the graph is symmetrical with respect to 1945

a. x axis
b. y axis
c. both x and y axis
*d. line $x = -b/a$
e. no line

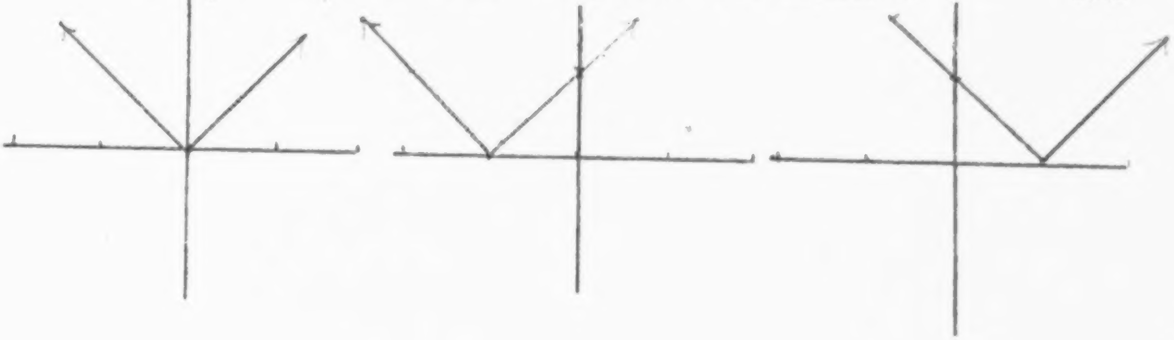
4. Consider the equation $y = |ax|$, then the graph with the greatest steepness is when a has a value of 1946

a. 2
*b. -5
c. 3
d. 1/2
e. -1

5. If $b = 0$ and $a = 1$, then the graphs $y = |ax + b| + c$ and $y = |x|$ are: 1947

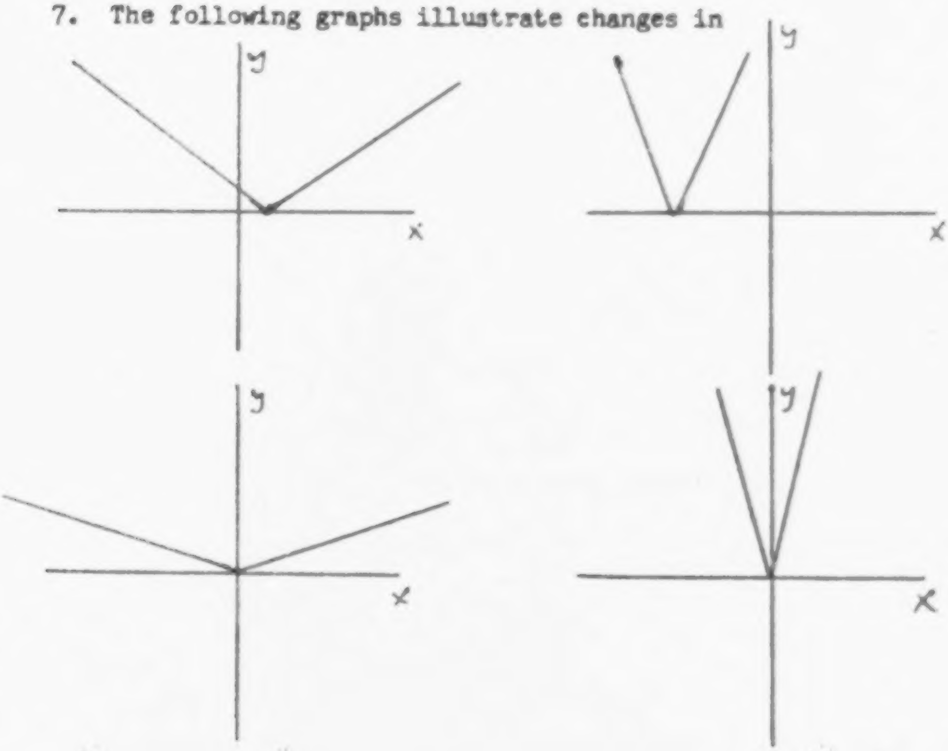
a. the same steepness but moved along the x axis
b. reflections of each other
c. different steepness but not moved along the x axis
*d. same steepness but moved along the y axis
e. different steepness but not moved along the y axis

6. If $y = |ax + b| + c$, the following graphs all illustrate 1948



a. a change in the value of a
*b. a change in the value of b
c. a change in the value of c
d. a change in the values of a + b
e. a change in the values of a + c
f. a change in the values of a, b, and c.

7. The following graphs illustrate changes in 1949



A. a only
b. b only
c. c only
*d. a and b
e. a and c
f. b and c

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO COMPREHEND WHETHER OR NOT A FUNCTION IS PERIODIC BY IDENTIFYING PERIODIC FUNCTIONS IN A LIST. (1) 0599

1. Which of the following are not periodic functions? 2140

a. The continuous procession of the hands of a clock as they revolve to give the hours of the day.
b. the police made chalkmark on the tire of a car as it travels home from downtown Hinsdale.
*c. The up and down motion of a yo-yo in the hands of a ten-year old boy.
d. The motion of a tether-ball around the pole after it has been hit.
e. The swing of a pendulum on a grandfather's clock.

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF THE WINDING FUNCTION TO REDUCE AN EXPRESSION TO A SIMPLER EXPRESSION AND THEN REDUCE THIS TO COORDINATES ON THE UNIT CIRCLE BY CHOOSING THE CORRECT ALTERNATE FORM. (2) 0295

With reference to a unit circle, the coordinates of the point which corresponds to $W\left(\frac{47}{4}\right)$ is ____________. 1377

a. $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

b. $\left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

*c. $\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$

d. $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$

Which of the following expressions best represents 1378

$- \cos \left(\frac{\pi}{3} + \frac{\pi}{2} \right)$

a. $- \cos \frac{\pi}{3}$

b. $- \sin \frac{\pi}{3}$

c. $\cos \frac{\pi}{3}$

*d. $\sin \frac{\pi}{3}$

THE STUDENT WILL BE ABLE TO SHOW HIS KNOWLEDGE OF FUNCTIONAL NOTATION AND EVALUATING FUNCTIONS BY EVALUATING FUNCTIONS FOR PARTICULAR VALUES OF X. (2) 0524

1. If $f(x) = \frac{1 + x^2}{2x}$ the value of $3f(x) - f(3x)$ is 1928

a. $\frac{4 + 9x^2}{3x}$

b. $\frac{8 + 3x^2}{6x}$

c. 0

*d. $\frac{4}{3x}$

e. $\frac{8 + 15x^2}{6x}$

2. If $f(x) = \frac{2+x}{2-x}$, the value of $\frac{f(x) - f(-x)}{1 + f(x)\,f(-x)}$ is 1929

a. $4x$

*b. $\frac{4x}{4 - x^2}$

c. $\frac{x^2 + 4}{4 - x^2}$

d. $-3/2$

e. 0

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF THE ROTATION OF AXES PROCEDURES BY FINDING THE ANGLE THROUGH WHICH THE COORDINATE AXES ARE ROTATED SO THAT THE TRANSFORMED EQUATION DOES NOT CONTAIN AN $X'Y'$ TERM RELATIVE TO THE X' AND Y' AXES. (2) 0526

1. The angle θ, through which the coordinate axes should be rotated so that the equation $8x^2 + 24xy + y^2 + 5x - 10y = 0$ will not contain an $x'y'$ term relative to the $x'y'$ axes, has a value of tangent equal to 1932

a. 24/7
b. -24/7
*c. 3/4
d. -3/4

2. If the coordinate axes are rotated thru $\alpha = 45^\circ$, the equation $5x^2 + 26\,xy + 5y^2 = 72$, relative to the $x'y'$ axes is transformed into the equation. 1933

a. $\frac{x'^2}{4} \; \frac{y'^2}{9} = 1$

b. $\frac{x'^2}{2} - \frac{2y'^2}{9} = 1$

c. $\frac{x'^2}{2} - \frac{y'^2}{2} = 1$

*d. $\frac{x'^2}{4} - \frac{y'^2}{9} = 1$

e. $\frac{x'^2}{2} + \frac{2y'^2}{9} = 1$

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE METHOD TO TRANSLATE COORDINATE AXES BY IDENTIFYING THE RELATIONSHIP BETWEEN THE NEW AND OLD COORDINTATE AXES OF THE TRANSFORMED EQUATION. (2) 0527

1. If $x^2 + y^2 - 4x - 12y - 9 = 0$ is transformed into $x'^2 + y'^2 = 49$ by a translation of coordinate axes then 1934

*a. $x' = x - 2$ and $y' = y - 6$
b. $x' = x + 2$ and $y' = y + 6$
c. $x' = x - 2$ and $y' = y + 6$
d. $x' = x + 2$ and $y' = y - 6$

2. If the origin is translated to (3, -2) then the equation $9x^2 + 4y^2 - 54x + 16y + 61 = 0$ is transformed to the equation 1935

a. $\frac{x'^2}{9} + \frac{y'^2}{4} = 1$

*b. $\frac{x'^2}{4} + \frac{y'^2}{9} = 1$

c. $\frac{(x' - 6)^2}{4} + \frac{(y' + 4)^2}{9} = 1$

d. $\frac{3x'^2}{16} + \frac{y'^2}{12} = 1$

THE STUDENT IS ABLE TO DIFFERENTIATE BETWEEN A RELATION THAT IS A FUNCTION AND A RELATION THAT IS NOT A FUNCTION BY CHOOSING RELATIONS WHICH ARE FUNCTIONS. (4) 0084

Which of the relations below is a function? 0183

a. {(2, 1), (1,0), (2,3), (-1, 1)}

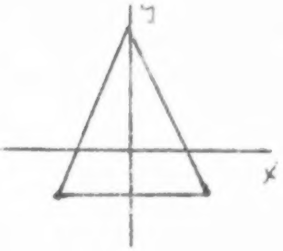
*b. {(1, 2), (0,1), (3,2), (-1, 1)}

c. {(0,4), (-2, 3), (1,2), (0,3)}

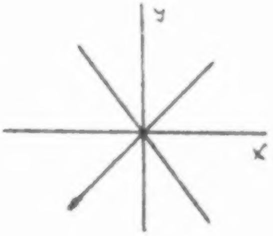
d. {(4,1), (3,2), (-6, 4), (3,1)}

Which of the relations below represents a function? 0184

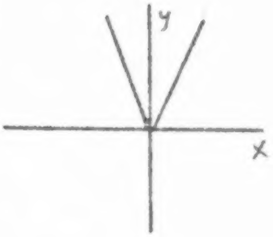
a.



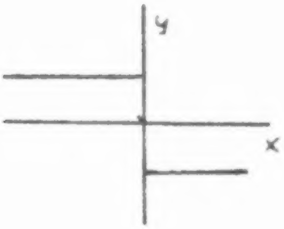
b.



*c.



d.

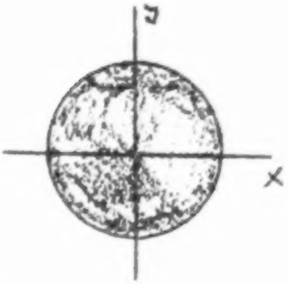


A function is a relation that 0185

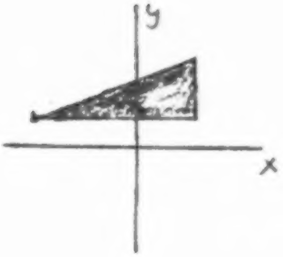
*a. Assigns to each element in the domain one and only one element in the range.
b. Assigns to each element in the range one and only one element in the domain.
c. Allows the graph of the relation to be intersected by a horizontal line in at most two distinct points.
d. Allows the graph of the relation to be intersected by a vertical line in at most one point.

Which of the relations below represents a function? 0186

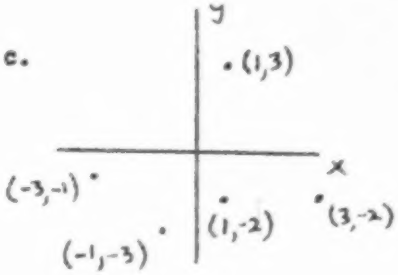
a.



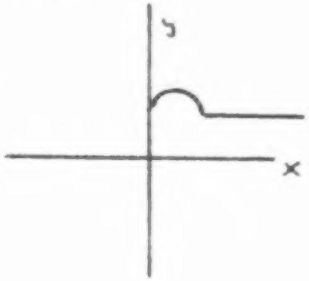
b.



c.



*d.



THE STUDENT DEMONSTRATES AN UNDERSTANDING OF DIRECT VARIATION AND PROPORTION BY SELECTING THE CORRECT EQUATION FOR EACH STATEMENT. (6) 0085

Translate the following statement into a formula expressing direct variation. 0187

The heat h required to melt a substance varies with its mass m.

a. $\frac{m}{h} = k$

*b. $\frac{h}{m} = k$

c. $m = hk$

d. $mh = k$

What is y when x = 25 if y varies directly as x, and y = 3, when x = 15 ? 0188

a. 125

b. $\frac{1}{5}$

c. 25

*d. 5

What is the mean proportional between 2 and 18? 0189

a. $\pm 3\sqrt{3}$

b. ± 3

*c. ± 6

d. $\pm\sqrt{6}$

What is x when y = 36 if y is proportional to 2x + 3, and y = 12, when x = 6 ? 0190

*a. 21
b. 13
c. 22
d. 16

Find y when x = 15. If x varies directly as 2y - 1, and x = 9 when y = 2. 0191

a. y = 8
b. y = 23
*c. y = 3
d. y = 4

Find x if $3:4 = 2:x$ 0192

*a. $\frac{8}{3}$

b. $\frac{2}{3}$

c. $\frac{5}{3}$

d. $\frac{7}{3}$

THE STUDENT DEMONSTRATES A KNOWLEDGE OF DIRECT VARIATION BY CHOOSING THE CORRECT SOLUTION FOR EACH VARIATION GIVEN. (3) 0100

What is y when $x = 7$ if y varies directly as x, and $y = 27$ when $x = 3$? 0247

a. $6 = 9$
*b. $y = 63$
c. $y = 42$
d. $y = 12$

What is x when $y = 6$, if x is directly proportional to y^2, and $x = 6$ when $y = 2$? 0248

a. $\frac{2}{3}$

*b. 54

c. 24

d. $\frac{3}{2}$

What is y when $x = 5$, if y is directly proportional to x^2, and $y = 36$ when $x = 3$? 0249

a. $\frac{25}{4}$

b. 4

c. $\frac{1}{4}$

*d. 100

THE STUDENT DEMONSTRATES A WORKABLE KNOWLEDGE OF INVERSE VARIANCE BY CHOOSING THE CORRECT SOLUTION TO AN INVERSE RELATIONSHIP PROBLEM. (3) 0086

What is x when $y = 4$ if x is inversely proportional to y and $x = 2$ when $y = 3$? 0193

a. $\frac{2}{3}$

*b. $\frac{3}{2}$

c. $\frac{5}{4}$

d. $\frac{3}{4}$

In the following inverse relationship if $x_1 = 12$ 0194

$x_2 = 15$, $y_1 = 20$, $y_2 = ?$

a. $x = 30$
b. $x = 10$
*c. $x = 16$
d. $x = 9$

In the following inverse relationship where would a weight of 400 grams balance the stick if 200 grams is 40 centimeters from the center? 0195

*a. 20 centimeters
b. 2 centimeters
c. 200 centimeters
d. 10 centimeters

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO TRANSLATE IDEAS OF VARIATIONS INTO SYMBOLIC FORM BY SELECTING THE CORRECT FORM FOR A GIVEN VARIATION. (2) 0304

In the following variation, $V = \frac{k\,r^3}{s}$. If r is doubled what change, if any, will occur in s? 0473

a. twice as large
b. one eighth as large
c. half as large
*d. eight times as great
e. stays the same

If a varies directly with b and inversely with c, how should it be written? 0474

a. $\frac{a}{b} = kc$
*b. $a = \frac{kb}{c}$
c. $ac = \underline{k}$
d. $\frac{ab}{c} = k$

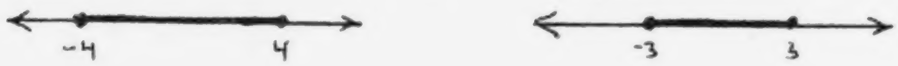
THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF DOMAIN AND RANGE OF A RELATION BY IDENTIFYING THE DOMAIN AND RANGE OF A GIVEN RELATION. (2) 0598

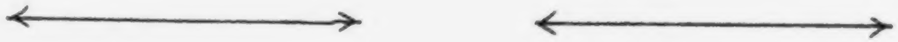
1. The domain and range of $\{(x,y): y = 5 - x^2\}$ are 2138

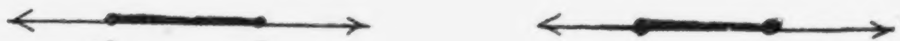
a. dom = $\{x: x \le 5\}$, rng = $\{y: y \in R\}$
b. dom = $\{x: x \in R\}$, rng = $\{y: y \in R\}$
*c. dom = $\{x: x \in R\}$, rng = $\{y: y \le 5\}$
d. dom = $\{x: x \le 5\}$, rng = $\{y: y \le 5\}$
e. dom = $\{x: x \ge 5\}$, rng = $\{y: y \le 5\}$

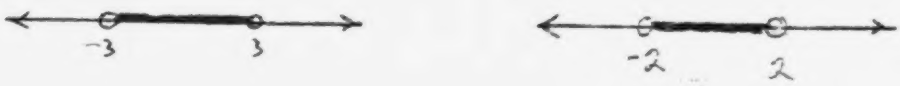
2. The domain and range of $\{(x, y): 4x^2 + 9y^2 = 36\}$ are illustrated on the number line as 2139

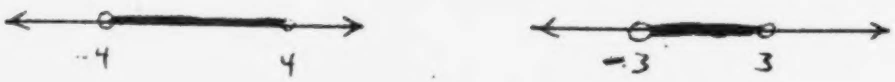
domains ranges

a.


b.


*c.


d.


e.


THE STUDENT WILL DEMONSTRATE KNOWLEDGE OF BASIC FORMULAS BY MATCHING GEOMETRIC FIGURES WITH THE RELATIONS THAT APPLY TO THEM. (10) 0233

A	πr^2	A. Circle	1177
D	$\frac{1}{2}bh$	B. Rectangle	1178
C	4s	C. Square	1179
B	lw	D. Triangle	1180
F	3 r	E. Trapezoid	1181
E	$\frac{1}{2}(a+b)h$	F. None of the above	1182
C	x^2		1183
F	rt		1184
F	21 + w		1185
A	2r		1186

THE STUDENT CAN TRANSLATE RELATIONS BY SELECTING EQUATIONS WHICH CORRECTLY REPRESENT THE RELATIONSHIPS IN PROBLEMS. (6) 0318

1. Select the correct equation which represents the relationship stated in the problem. 838

Seven times a boy's weight, w, is 300 pounds.

a. $w + 7 = 300$

b. $7 - w = 300$

c. $\frac{w}{7} = 300$

*d. $7w = 300$

2. Select the correct equation which represents the relationship: three times a number diminished by six is 21. 839

*a. $3x - 6 = 21$
b. $6 - 3x = 21$
c. $3x = 21 - 6$
d. $3(x - 6) = 21$

3. Select the correct equation which represents the relationship: One-quarter of a number subtracted from 25 is 5. 840

a. $\frac{1}{4}x + 25 = 5$
*b. $25 - \frac{1}{4}x = 5$
c. $\frac{1}{4}x - 25 = 5$
d. $\frac{1}{4}(25) - x = 5$

4. Select the correct equations which represents the relationship: One-half of a number ;increased by two-thirds of the number is 14. 841

a. $2x + 2/3x = 14$

b. $2/3x - \frac{1}{2}x = 14$

*c. $\frac{1}{2}x + 2/3x = 14$

d. $\frac{1}{2}x - 2/3x = 14$

5. A girl spends $5 or 1/5 of her money m. How much money did she have in the beginning? 842

a. $m + 1/5 = 5$

*b. $\frac{m}{5} = 5$

c. $5m = 5$
d. $m - 1/5 = 5$

6. Select the correct equations which represents the relationship: One-half the sum of a number increased by forty and decreased by thirty is 50. 843

a. $\frac{1}{2}x + 40 + 30 = 50$

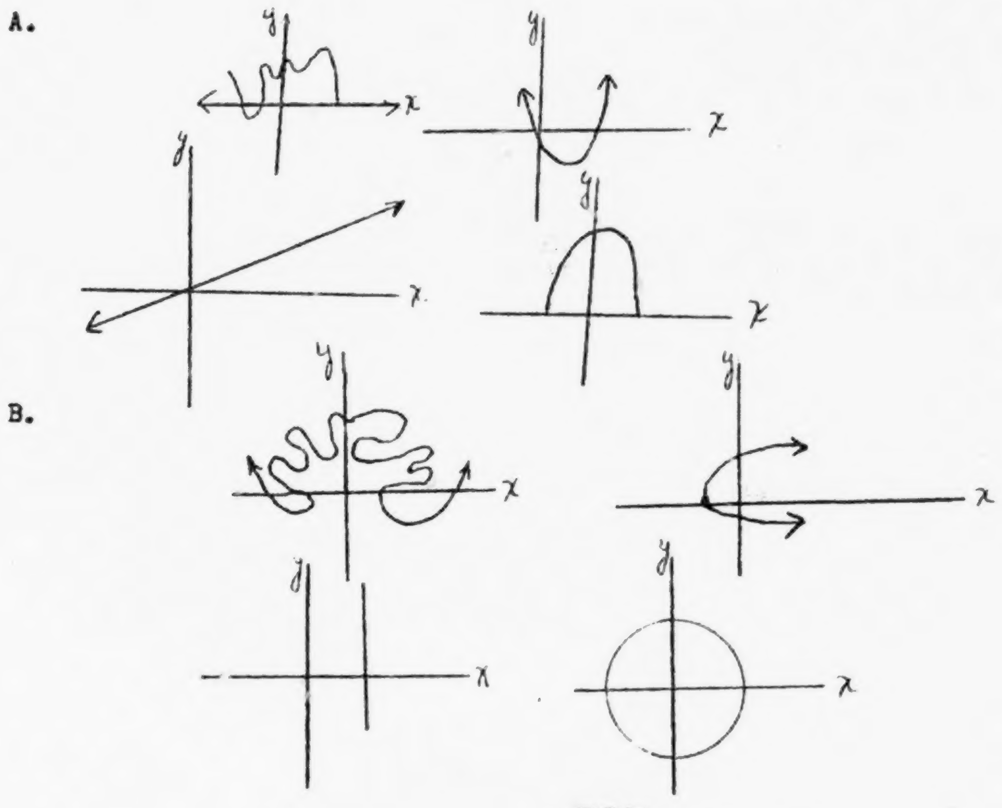
b. $\frac{1}{2}(x + 40) + 30 = 50$

c. $\frac{1}{2}x + 40 - 30 = 50$

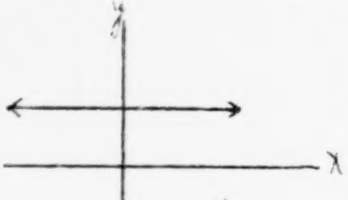
*d. $\frac{1}{2}(x + 40) - 30 = 50$

THE STUDENT WILL SHOW HIS ABILITY TO ANALYZE SPECIFIC EXAMPLES OF FUNCTION AND RELATION GRAPHS TO IDENTIFY COMMON CHARACTERISTICS PRESENT. (5) 0356

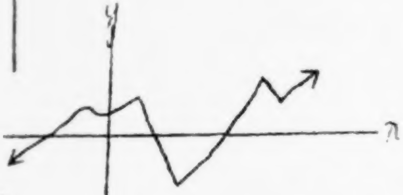
After you have examined these two sets of graphs carefully, identify the set to which each of those following the illustration belong.



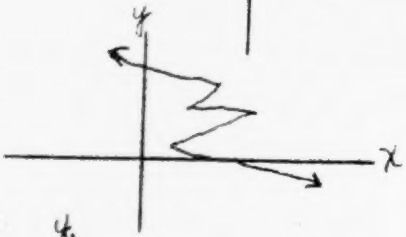
a. A 1063



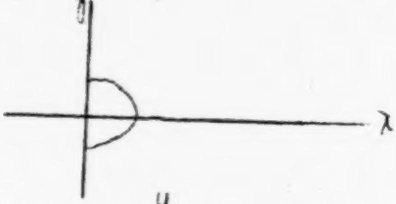
b. A 1064



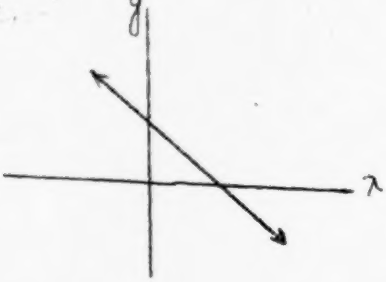
c. B 1065



d. B 1066



e. A 1067



THE STUDENT WILL SHOW HIS COMPREHENSION OF THE TERM *EQUIVALENCE RELATION* BY DETERMINING THE NUMBER OR KIND OF PROPERTIES A GIVEN RELATION CONTAINS. (3) 0561

1. In order for a relation "O" on a set N to be an equivalence relation, it must have how many properties? 2028

a. one
b. two
*c. three
d. four
e. five

2. If a $\in$ N and the symbol "O" defines a relation, then a o a is a statement of the __________ property. 2029

*a. reflexive
b. symmetric
c. transitive
d. associative
e. commutative

3. If a,b $\in$ N and the symbol "O" defines a relation, the a o b = b o a is a statement of the __________ property. 2030

a. reflexive
*b. symmetric
c. transitive
d. associative
e. commutative

THE STUDENT WILL APPLY THE CONCEPT OF EQUIVALENCE RELATION WHEN GIVEN A RELATION TO CLASSIFY BY DETERMINING THE NUMBER OF NECESSARY PROPERTIES *NOT* SATISFIED. (2) 0562

1. Does "is collinear with" define an equivalence relation on set S of all segments? 2031

*a. yes
b. no, because one and only one of the necessary properties is NOT satisfied.
c. no, because exactly two of the necessary properties are NOT satisfied.
d. no, because more than two of the necessary properties are NOT satisfied.

2. Does "is a multiple of" define an equivalence relation on set S of all integers? 2032

a. Yes
*b. No, because exactly one of the necessary properties is NOT satisfied.
c. No, because exactly two of the necessary properties is NOT satisfied.
d. No, because more than two of the necessary properties is NOT satisfied.

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF EQUIVALENCE RELATIONS BY DETERMING WHICH OF GIVEN RELATIONS ARE EQUIVALENT. (1) 0679

1. Which of the following are equivalent relations? 2594

a. is perpendicular to
b. is congruent to
c. is parallel to
d. a and b
*e. c and d

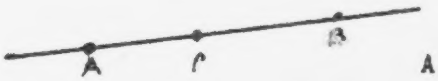
GRAPHING

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF THE NAMING OF THE POINTS ON THE CARTESIAN COORDINATE PLANE BY SELECTING THE NUMBER OF POINTS FORMED USING ONLY TWO SYMBOLS. (1) 0275

Using the symbols x and x′ how many points on the cartesian coordinate plane can be named? 1345

*a. 4
b. 1
c. 2
d. 16

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF THE POINT OF DIVISION BY SELECTING CORRECT ANSWERS FOR PROBLEMS USING FORMULAS FOR COMPUTING THE POINT OF DIVISION. (2) 0608

1. If in the figure  A = (2, 3), B = (10, 4) and the x-coordinate of P is 5, then the ratio $\frac{AP}{PB}$ is: 2158

*a. 3/5
b. 3/2
c. 3/8
d. 5/3
e. 2/3

2. If the ratio $\frac{AP}{PB}$ = 3/5, A = (2, 3) and B = (10, 4) what are the coordinates of P? 2159

a. (30/8, 8/3)
*b. (5, 3 3/8)
c. (8, 3 3/8)
d. (27/8, 5)

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE THE FORMULA FOR THE X-COORDINATE OF A POINT OF DIVISION BY SELECTING STATEMENTS WHICH WILL SUPPORT THE FORMULA. (1) 0609

1. The formula for the x-coordinate of the point of division is 2160

$x = \dfrac{x_2r_1 + x_1r_2}{r_1 + r_2}$. Which of the following statements does not follow from this formula?

a. The point of division divides the line segment into the ratio r_1/r_2

b. The x-coordinate of the midpoint is $(x_2 + x_1) / 2$

c. $(x - x_1) / (x_2 - x) = r_1 / r_2$

*d. $(r_1 + r_2)^2 = (x_1 + x_2)^2 + (y_1 + y_2)^2$

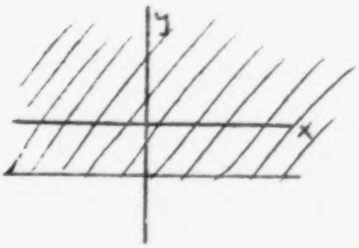
e. The x-coordinate of a point on the line segment one-third of the distance from (x_1, y_1) is $\dfrac{x_2 + 2x_1}{3}$

INEQUALITIES

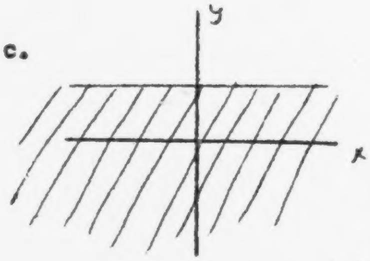
THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF GRAPHING AN INEQUALITY IN TWO VARIABLES BY SELECTING THE CORRECT GRAPH FOR EACH INEQUALITY. (2) 0069

The graph of the inequality $y \geq -3$ is best exemplified by 0133

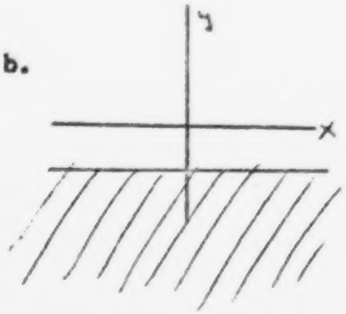
*a.



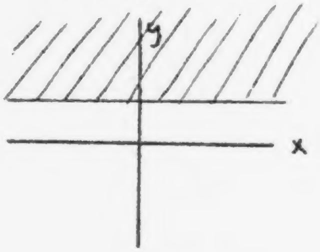
c.



b.

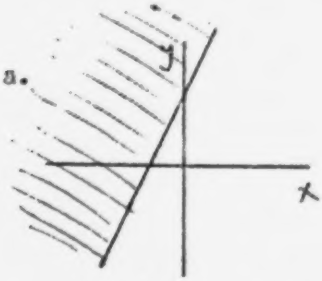


d.

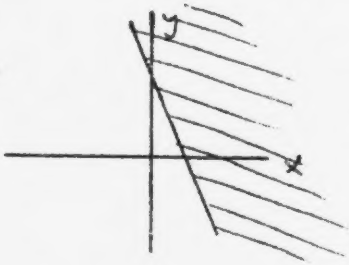


The graph of the inequaltiy $y + 5x \geq 2$ is 0134

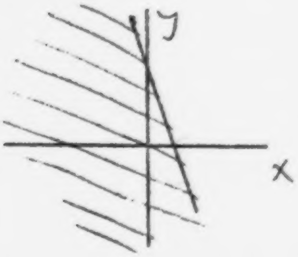
a.



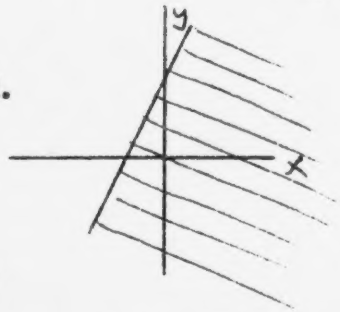
*c.



b.



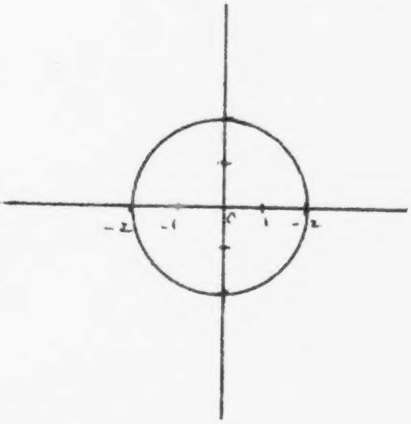
d.



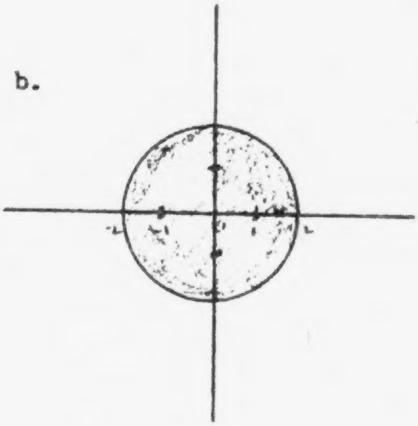
THE STUDENT CAN TRANSLATE AN ALGEBRAIC INEQUALITY INTO ITS GEOMETRIC GRAPH BY IDENTIFYING THE GRAPH OF THE INEQUALITY. (4) 0411

Directions: The graphs below are to be used in answering the next four questions by matching them with the correct inequality.

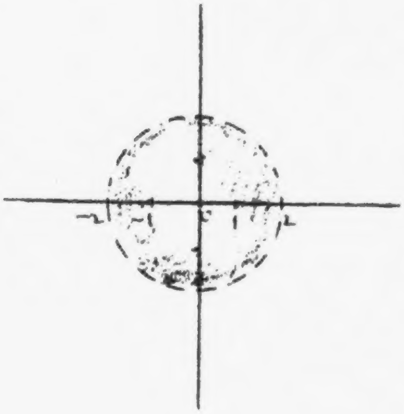
a.



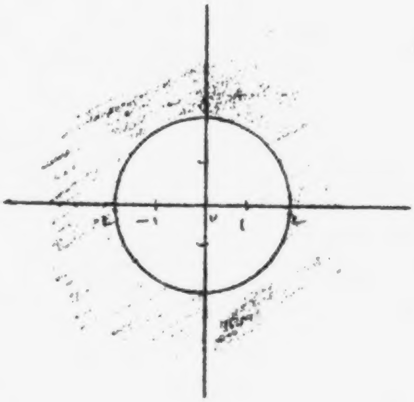
b.



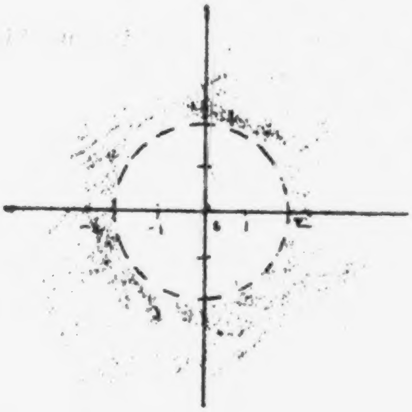
c.



d.



e.



e 1. The graph representing the inequality $x^2 + y^2 > 4$ is_____. 1601

c 2. The graph representing the inequality $x^2 + y^2 < 4$ is_____. 1602

d 3. The graph representing the inequality $x^2 + y^2 \geq 4$ is_____. 1603

b 4. The graph representing the inequality $x^2 + y^2 \leq 4$ is_____. 1604

THE STUDENT DEMONSTRATES HIS ABILITY TO IDENTIFY THE PROPERTIES OF INEQUALITIES WHEN HE CHOOSES THE PROPERTY FOR A GIVEN ILLUSTRATION. (2) 0234

The statement "If $a > b$ and $b > c$ then $a > c$" is an example of... 1187

a. Trichotomy Law
b. Order Property
*c. Transitive property
d. definition of greater then
e. none of the above

The statement "If $a > b$ then $ac > bc$" is true... 1188

a. if $a > o$
*b. if $c > o$
c. if $c < o$
d. for all numbers
e. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THEOREMS RELATING TO INEQUALITIES BY CORRECTLY IDENTIFYING THE SOLUTION SET. (2) 0525

1. The solution set for the inequality $\frac{x}{x+2} > 4$ is 1930

a. $x < -8/3$
b. $x < -2$
c. $x > -2$ or $x < -8/3$
d. $x > -2$ and $x < -8/3$
*e. $-8/3 < x$ and $x < -2$

2. The solution set for the inequality $\frac{2}{x-2} \geq \frac{4}{x}$ 1931

a. $x \leq 0$ or $2 \leq x \leq 4$
b. $x > 0$ and $x \neq 2$
c. $0 < x < 2$ or $x \geq 4$
*d. $x < 0$ or $2 < x \leq 4$
e. $x < 0$ or $x \geq 4$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF INEQUALITY PROPERTIES BY IDENTIFYING THE CORRECT PROCEDURE IN DERIVING AN INEQUALITY. (1) 0543

1. If $0 < a < b$ and $c \geq 0$ then a correct procedure to derive $\frac{a}{b} \leq \frac{a+c}{b+c}$ 1983

from
1. $ab+ac \leq ab+bc$
2. $a(b+c) \leq b(a+c)$
3. $ac \leq bc$
4. $\frac{a}{b} \leq \frac{a+c}{b+c}$

would be
*a. 3 - 1 - 2 - 4
b. 4 - 2 - 1 - 3
c. 3 - 2 - 1 - 4
d. 4 - 1 - 2 - 3

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE A FIRST DEGREE INEQUALITY IN ONE VARIABLE WHEN HE CHOOSES THE CORRECT SOLUTION. (3) 0235

The solution for the inequality $-2X - 5 > 11$ is... 1189

a. $x > -8$
b. $x > -3$
*c. $x < -8$
d. $x < 3$
e. none of the above

The solution for the inequality $12X - 12 < 15X - 6$ is... 1190

a. $X < -2$
b. $X < 2$
c. $X > 2$
*d. $X > -2$
e. none of the above

Consider the following:

$3y - 6 > 15y - 21$

$3y > 15y - 27$ Step #1

$-12y > -27$ Step #2

$y < 9/4$ Step #3

If an error occurs in the above solution it occurs in 1191

*a. step #1
b. step #2
c. step #3
d. steps #1 and #3
e. none of the above; there is no error

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE QUADRATIC INEQUALITIES BY CHOOSING THE CORRECT SOLUTION FOR EACH INEQUALITY. (3) 0113

What is the solution set of the quadratic inequality $x^2 + x \leq 6$? 0290

a. $\{x : x^2 + x \leq 6\} = \{x : -2 \leq x < 3\}$

b. $\{x : x^2 + x \leq 6\} = \{x : x \geq 3\}$

c. $\{x : x^2 + x \leq 6\} = \{x : x \leq 2\}$

*d. $\{x : x^2 + x \leq 6\} = \{x : -3 \leq x \leq 2\}$

What is the solution set of the quadratic inequality $x^2 + 8x - 9 > 0$? 0291

*a. $\{x : x^2 + 8x - 9 > 0\} = \{x : x > 1 \text{ or } x < -9\}$

b. $\{x : x^2 + 8x - 9 > 0\} = \{x : -9 < x < 1\}$

c. $\{x : x^2 + 8x - 9 > 0\} = \{x > -9\}$

d. $\{x : x^2 + 8x - 9 > 0\} = \{x \leq 1\}$

What is the solution set of the quadratic inequality $x^2 + 3x \leq 18$? 0292

a. $\{x : x^2 + 3x \leq 18\} = \{x : x < 6 \text{ or } x \geq 3\}$

b. $\{x : x^2 + 3x \leq 18\} = \{x : x < 6\}$

*c. $\{x : x^2 + 3x \leq 18\} = \{x : -6 \leq x \leq 3\}$

d. $\{x : x^2 + 3x < 18\} = \{x : x \leq 3\}$

THE STUDENT WILL BE ABLE TO DEVELOP THE SOLUTION OF A QUADRATIC INEQUALITY TWO WAYS, ONE IS THE ALGEBRAIC, THE OTHER GRAPHIC, BY USING THE SOLUTION OF THE QUADRATIC EQUATION AS AN INSTRUMENT TO SELECT THE SOLUTION SET. (4) 0308

Reviewing that $x^2 + 4xy + 3y^2 = 0$

$(x+3y)(x+y) = 0$

$x+3y = 0 \quad x+y = 0$

applies the theorem: $a = 0$ or $b = 0$, if and only if $ab = 0$ then which would be true in reference to the inequality $(x+a)(x+b) < 0$? 0484

a. $x+a < 0 \wedge x+b > 0$
b. $x+a > 0 \wedge x+b < 0$
c. $x+a < 0 \wedge x+b < 0$
*d. a and b
e. b and c
f. none of the above

Which of the following satisfies $2x^2 + 3x - 14 \geq 0$? 0485

*a. $2x + 7 \geq 0 \wedge x - 2 \geq 0$
or
$2x + 7 \leq 0 \wedge x - 2 \leq 0$
b. $2x + 7 \geq 0 \wedge x - 2 \leq 0$
or
$2x + 7 \leq 0 \wedge x - 2 \leq 0$
c. $2x + 7 \geq 0 \vee x - 2 \geq 0$
d. $2x + 7 \leq 0 \wedge x - 2 \leq 0$

Choose the correct representation of the solution set of 0486

$x^2 + 2x > 99$.

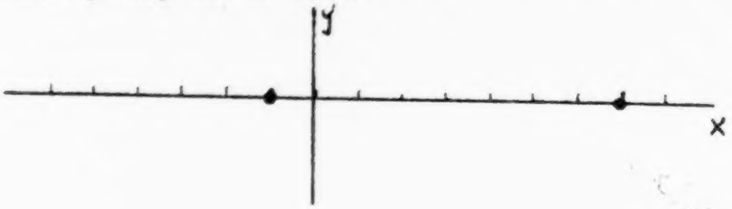
a. $\{x \mid 9 < x < 11\}$

b. $\{x \mid -11 < x < 9\}$

c. $\{x \mid x < 9 \text{ or } x > -11\}$

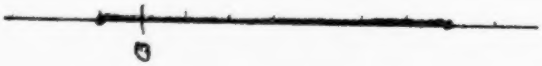
*d. $\{x \mid x > 9 \text{ or } x < -11\}$

Since the zeros of function $x^2 - 6x - 7 = 0$ are -1 and 7 graphically they can be shown

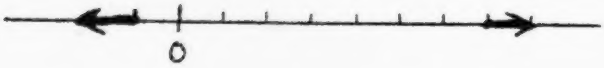


If $x^2 - 6x - 7 < 0$, which of the following is the graph of the solution set? 0487

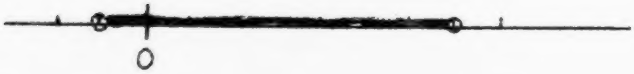
a.



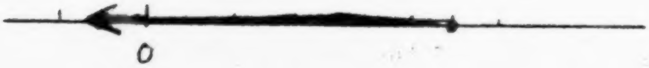
b.



*c.



d.

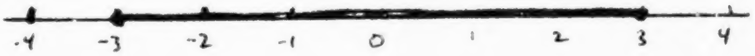


THE STUDENT CAN TRANSLATE THE SOLUTION SET OF A QUADRATIC INEQUALITY TO THE NUMBER LINE BY IDENTIFYING THE GRAPH OF ITS SOLUTION SET. (2) 0385

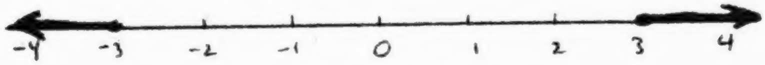
1. The graph of the solution set on the number line of 1525

$x^2 - 9 > 0$ is

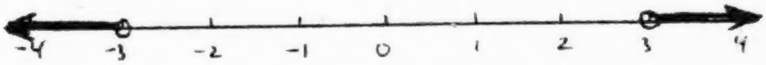
a.



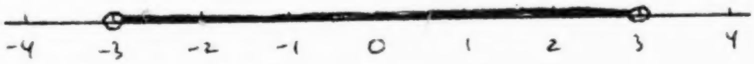
b.



*c.



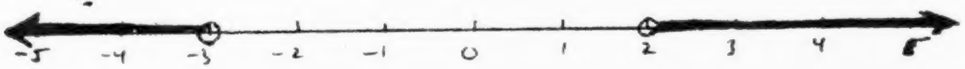
d.



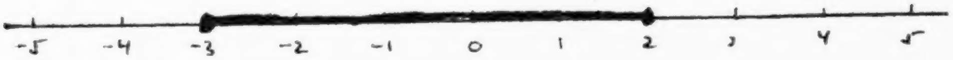
2. The graph of the solution set on the number line of 1526

$x^2 + x \leq 6$ is

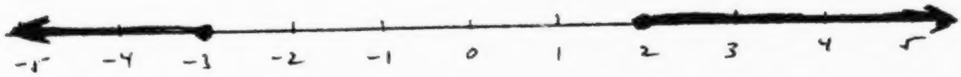
a.


-5
-4
-3
-2
-1
0
1
2
3
4
5

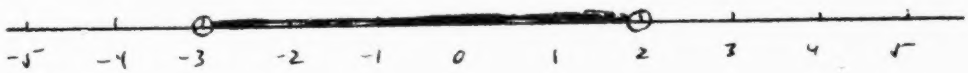
*b.


-5
-4
-3
-2
-1
0
1
2
3
4
5

c.


-5
-4
-3
-2
-1
0
1
2
3
4
5

d.


-5
-4
-3
-2
-1
0
1
2
3
4
5

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO ANALYZE THE CORRECT PROCEDURES TO FIND SOLUTION SETS OF INEQUALITIES BY SELECTING AN INCORRECT OPERATION IN THE PROCESS. (2) 0529

1. In solving $x^3 - 4X \leq 0$, which of the following is not a correct operation? 1938

a. remove a common factor of X
*b. divide both sides by X
c. factor $X^2 - 4$ as $(X + 2)(X - 2)$
d. consider the values for which $X^3 - 4X = 0$ as critical points
e. investigate the values of X between the critical points on a number line.

2. If a is a positive real number, then in order to prove $a^2 + 1/a \geq 2$ is true, which of the following are NOT necessary in the proof. 1939

*a. $a > 0$
b. $(a - 1)^2 \geq 0$
c. $(a - 1)^2 = a^2 - 2a + 1$
d. all of the above are necessary.

MEASUREMENT

THE STUDENT CAN SHOW HIS COMPREHENSION OF THE MEASUREMENT POSTULATE BY FINDING THE MEASURE OF A LINE SEGMENT OR THE MISSING COORDINATE. (3) 0556

1. If the coordinate of A is 5 and the coordinate of B is 7, then d (B,A) is______. 2018

a. 12
b. -2
*c. +2
d. 6

2. If the coordinate of M is 7 and d (M,N) = 5, then the coordinate (s) for N would be best described by_______. 2019

a. 12
b. 2
c. 6
*d. 12, 2

3. If the coordinate of P is -5 1/4 and of Q is -2 1/2 then d (P,Q) is_______. 2020

*a. + 11/4
b. +3
c. -3
d. -11/4

THE STUDENT WILL RECALL THE DEFINITION OF MEASURE OF LINE SEGMENTS BY REWRITING IN TERMS OF CONGRUENCE. (1) 0563

1. If $d(A,B) = (C,D)$, then________. 2033

a. $AB = CD$

B. $\overline{AB} = \overline{CD}$

c. $AB \cong CD$

*d. $\overline{AB} \cong \overline{CD}$

THE STUDENT WILL RECALL THE DEFINITION OF MIDPOINT BY REWRITING IT IN TERMS OF CONGRUENCE. (1) 0564

1. If W is the midpoint of $\overline{AB}$, then an equivalent statement is__________. 2034

a. $AW = WB$

b. $\overline{AW} = \overline{WB}$

*c. $\overline{AW} \cong \overline{WB}$

d. $AW \cong WB$

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE RELATIONSHIPS TRANSVERSALS, AND BISECTORS BY IDENTIFYING THE RELATIONSHIP BETWEEN GIVEN BISECTORS, RAYS OR LINES. (5) 0617

1. Calculate the length of arc intercepted by an angle $\pi/4$ in a circle with radius 3. 2183

a. 24π
*b. $3\pi/4$
c. $3/2\pi$
d. $4/3\pi$
e. $1/8\pi$

2. Calculate the degree measure of a central angle inercepting an arc of π length in a circle of radius 9. 2184

a. $\pi/9^R$

*b. 20°

c. 30°

d. 40°

e. $9\pi^R$

3. Calculate the radius of the circle whose central angle of 80° intercepts an arc of $\frac{16}{9}\pi$ units. 2185

a. $80\pi/9$
b. $9\pi/80$
c. 4π
*d. 4
e. $4\pi/9$

4. Suppose a circle is divided into 100 equal arcs. Let us refer to the measure of a central angle subtended by one of these arcs as one centangle. Find the length of arc intercepted by a central angle of $12\frac{1}{2}^c$ in a circle of radius 8. 2186

a. $2/3\pi$
b. $4/9\pi$
*c. 2π
d. 8π
e. $12\frac{1}{2}\pi$

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF LINEAR MEASUREMENT OF ARCS OF CIRCLES BY SOLVING PROBLEMS INVOLVING CIRCLES. (3) 0721

1. If the diameter of ⊙O has length 10, then the circumference (in terms of π) is 2829

*a. 10π
b. 5π
c. 100π
d. 25π

2. If an inscribed angle of 30° subtends an arc of length π in ⊙O , then the radius of the circle has length 2830

a. 12
b. 2
*c. 3
d. 6

3. If C is the midpoint of $\overset{\frown}{AB}$ in ⊙O , then 2831

a. $AC = \frac{1}{2}\ AB$
b. $AC < \frac{1}{2}\ AB$
c. $AC + CB = AB$
*d. $AC > \frac{1}{2}\ AB$

THE STUDENT CAN APPLY A KNOWLEDGE OF SPECIAL SEGMENTS DETERMINED BY MID-POINTS OF SIDES OF TRIANGLES AND QUADRILATERALS TO COMPUTE SEGMENT LENGTHS. (3) 0722

1. The sides of $\triangle ABC$ have lengths 4, 6, and 8. If $\overline{DE}$ is the segment joining the mid-points of the two shorter sides, then the length of $\overline{DE}$ is 2832

a. undetermined
*b. 4
c. 5
d. $\sqrt{13}$

2. The sides of $\triangle ABC$ have lengths 6, 8, and 10. The perimeter of the triangle formed by joining the mid-points of the three sides is 2833

a. 6
b. 14
*c. 12
d. 8

3. The bases of a trapezoid have length 8 and 12. The length of the segment joining the mid-points of the diagonals is 2834

a. 6
b. undetermined
c. 4
d. 2

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF THE RELATIONSHIPS OF SPECIAL SEGMENTS OF CIRCLES, TANGENTS, QUADRILATERALS, RIGHT TRIANGLES AND AUXILIARY SETS TO FORM CONVLUSIONS ABOUT SPECIFIC SEGMENTS. (10) 0723

1. The segment of centers of two circles has length 13. If the radii of the two circles are 7 and 2, then the length of a common external tangent segment is 2835

a. 13

b. $\sqrt{120}$

*c. 12

d. $\sqrt{165}$

2. The segment of centers of two circles has length 12. If the radii of the two circles are 6 and 2, then the length of a common internal tangent segment is 2836

*a. $4\sqrt{5}$
b. $\sqrt{32}$
c. 10
d. $4\sqrt{13}$

3. $\odot O$ and $\odot O'$ are externally tangent at A. A common external tangent segment $\overline{BC}$ intersects the common internal tangent at D. If the radii of the circles are 2 and 3, then the length of $\overline{DA}$ is 2837

a. $2\frac{1}{2}$

*b. $\sqrt{6}$

c. $\sqrt{26}$

d. $\frac{1}{2}\sqrt{26}$

4. $\odot O$ and $\odot O'$ are internally tangent at A. $\overleftrightarrow{OA}$ intersects the circles at A, O, and B with O between A and B. Chord $\overline{AC}$ of the larger circle intersects the smaller circle at D. If the radius of the smaller circle is 5 and BC = 12, then the length of CD is 2838

a. 16
b. 10
c. $\sqrt{61}$
*d. 8

5. $\odot O$ and $\odot O'$ are coplanar and intersect at distinct points A and B. $\overrightarrow{OA} \cap \odot O = C$ and $\overrightarrow{OA} \cap \odot O' = D$. If $\triangle ACO$ is equilateral, then which of the following is not necessarily true? 2839

a. $\triangle ADO'$ is equilateral
*b. $\overleftrightarrow{AB}$ bisects $\overline{CD}$
c. OC // O'D
d. $\overline{OO'} \perp \overline{AB}$

6. If two circles are tangent externally, then the number of distinct tangents common to the two circles is 2840

a. 2
b. 4
*c. 3
d. 1

7. If $\odot O$ is in the interior of $\odot O'$ then the number of distinct tangents common to the twp circles is 2841

*a. 0
b. 1
c. 2
d. 4

8. $\odot$ A, $\odot$ B, and $\odot$ C are coplanar and each circle is tangent externally to the other two circles. If the radii of the three circles are 3, 5, and 12, then the length of the median to the longest side of $\triangle$ ABC is 2842

a. 8
*b. $8\frac{1}{2}$
c. $\sqrt{60}$
d. 7

9. $\odot O$ and $\odot O'$ are tangent externally at A. If the radii of the circles are 3 and 4, then the length of a common external tangent segment is 2843

a. 5
b. $\sqrt{17}$
c. $\sqrt{15}$
*d. $4\sqrt{3}$

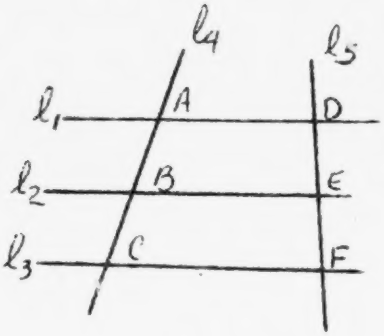
10. $\odot O$ and $\odot O'$ are internally tangent at A. If $\overline{OO'}$ intersects $\odot O'$ at B, CD is a chord of $\odot O$ which is tangent to $\odot O'$ at B, and B is the midpoint of $\overline{AO}$, then OCAD is 2844

a. a square
*b. a rhombus
c. a trapezoid
d. a rectangle

THE STUDENT CAN DEMONSTRATE THE ABILITY TO APPLY SIMILARITY AND PROPORTION PRINCIPLES TO FIND LENGTHS RESULTING FROM TRANSVERSALS OF PARALLEL LINES. (5) 0729

1. In $\triangle ABC$, line $\overleftrightarrow{XY}$ is parallel to $\overleftrightarrow{AB}$ and intersects $\overline{AC}$ and $\overline{BC}$ at D and E respectively. If CD = 3, AD = 5, and BC = 6, then the length of BE is 2926

a. 2
b. $3\frac{1}{4}$
*c. 3 3/4
d. $2\frac{1}{4}$

2. 

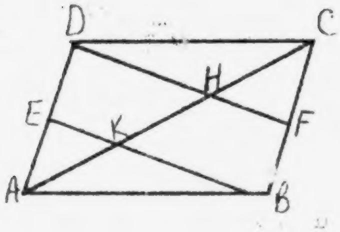
In the figure, if $l_1 \parallel l_2 \parallel l_3$, l_4 intersects l_1, l_2, l_3 at A, B, and C respectively, l_5 intersects l_1, l_2, l_3 at D, E, and F respectively, AB = 4, BC = 5, DE = 3, then the length of $\overline{EF}$ is 2927

a. $2\frac{2}{5}$
b. $6\frac{3}{4}$
c. $1\frac{1}{3}$
*d. $3\frac{3}{4}$

3. In △ABC if line $\overleftrightarrow{XY}$ intersects $\overline{AB}$ and $\overline{AC}$ at D and E respectively, AD = 3, DB = 4, and EC = 6, then what length of $\overline{AE}$ is sufficient to prove $\overleftrightarrow{XY} \parallel \overleftrightarrow{BC}$? 2928

a. 10
*b. $4\frac{1}{2}$
c. $2\frac{4}{7}$
d. 2

4. In the figure, if ABCD is a parallelogram, E and F are midpoints of AD and BC respectively, AC intersects $\overline{BE}$ and $\overline{DF}$ at K and H respecitvely, then 2929



a. AK = KB
b. EK = KB
c. $\frac{AH}{AC} = \frac{2}{3} = \frac{EK}{EB}$
*d. $\frac{KC}{HC} = \frac{DH}{EK}$

5. In △ABC, AB = 10, AC = 5, and BC = 6. If D is on AB and E is on AC, AD = 4, AE = 2, then the length of $\overline{DE}$ is 2930

a. 4
b. 3
*c. 2.4
d. $1\frac{2}{3}$

THE STUDENT DEMONSTRATES KNOWLEDGE OF WHOLE NUMBERS AND COUNTING NUMBERS BY CHOOSING EACH FROM EXAMPLES. (2) 0005

Which of the following name the set of the first ten counting number multiples of two? 1396

a. $\{2, 4, 6, 8, 10\}$

b. $\{0, 2, 4, 6, 8, ..., 20\}$

c. $\{0, 2, 4, 6, ..., 16, 18\}$

*d. $\{2, 4, 6, 8, ..., 20\}$

A word description of the set $\{0, 1, 2, 3, 4\}$ is 1397

*a. The set of the first five whole numbers.
b. The set of the first five counting numbers.
c. The set of whole numbers between 0 and 5.
d. The set of counting numbers less than 5.

THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE LEAST COMMON MULTIPLE OF TWO OR MORE COUNTING NUMBERS BY SELECTING THE LEAST COMMON MULTIPLE OF A GIVEN SET OF NUMBERS. (2) 0020

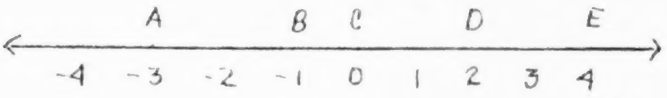
The least common multiple of 60 and 18 is 1447

a. 6
b. 1080
*c. 180
d. 2

Which of the following sets of numbers has 216 as its least common multiple? 1448

a. 12, 18
*b. 8, 27
c. 6, 36
d. 9, 24

THE STUDENT CAN GIVE THE DISTANCE AND DIRECTION FROM ONE NUMBER TO ANOTHER ON THE NUMBER LINE, THUS DEMONSTRATING KNOWLEDGE OF THE NUMBER LINE. (2) 0220



Directions: Select the best answer for the following questions on the basis of the above diagram.

The directed number representing the distance from point B to point D is 1133

*a. +3
b. -3
c. +4
d. -4
e. none of these

The directed number representing the distance from point E to point A is 1134

a + 7
*b. -7
c. + 8
d. - 8
e. none of these

THE STUDENT DEMONSTRATES HIS ABILITY TO GRAPH ON A NUMBER LINE BY IDENTIFYING THE TYPE OF GRAPH FOR A GIVEN EXAMPLE. (8) 0245

The graph of $3 \leq x \leq 7$ is an example of 1221

a. a closed ray
*b. a closed interval
c. an open interval
d. a half-open interval
e. none of the above

The graph of $|x| < 3$ is an example of 1222

a. a closed ray
b. an open ray
*c. an open interval
d. a closed interval
e. none of the above

The graph of $|x| > 2$ is an example of 1223

a. a closed ray
b. a closed interval
c. an open interval
d. a half-open interval
*e. none of the above

The graph of $\{x| \ x \text{ is an integer} > 2\}$ is an example 1224

a. an open ray
b. a closed ray
c. an open interval
d. a closed interval
*e. none of the above

The graph of $x \geq 3\frac{1}{2}$ is an example of 1225

a. an open ray
*b. a closed ray
c. a closed interval
d. a half-open interval
e. none of the above

The graph of $A = \{x \mid x = 5\} \cap B = \{x \mid x \geq 0\}$ is an example of 1226

a. two closed rays
b. two open rays
c. an open interval
*d. a closed interval
e. none of the above

The graph of $C = \{x \mid |x| < 1\} \cup D = \{x \mid |x| \leq 2\}$ is an example of 1227

*a. a closed interval
b. a closed ray
c. an open ray and one closed ray
d. a half-open interval
e. none of the above

The graph of $E = \{x \mid x > 3\} \quad F = \{x \mid x < -1\}$ is an example of 1228

a. two open rays
b. an open interval
c. a half-open interval
d. the whole number line
*e. none of these

THE STUDENT WILL BE ABLE TO RECALL THE PROCESS OF FINDING THE DISTANCE BETWEEN POINTS BY COMPUTING THE DISTANCE BETWEEN TWO POINTS ON A NUMBER LINE. (3) 0638

1. If the coordinate of A is -8 and B is -6, the distance from A to B is 2477

*a. 2
b. -2
c. 14
d. -14
e. none of the above.

2. If the coordinate of R is $5\frac{1}{4}$ and Q is 8 2/7, then the distance from R to Q is 2478

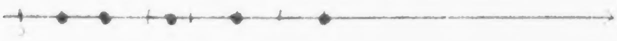
a. 3 1/3
b. -3 1/3
c. 3 15/28
d. 13 15/28
*e. none of the above.

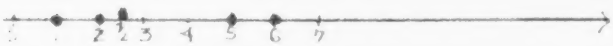
3. If the coordinate of C is -4 1/3 and D is 5 2/5, then the distance from C to D is 2479

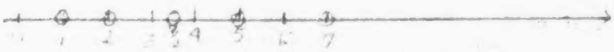
a. 14/15
b. -14/15
c. $9\frac{1}{4}$
*d. 9 11/15
e. none of the above.

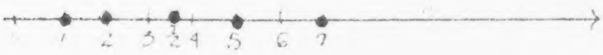
GIVEN A SET OF NUMBERS, THE STUDENT SHOULD BE ABLE TO RECOGNIZE ITS GRAPHICAL REPRESENTATION, DEMONSTRATING KNOWLEDGE OF GRAPHING. (4) 0008

Which of the following is the best graph of the set $\{1, 2, 7/2, 5, 7\}$? 1405

a.


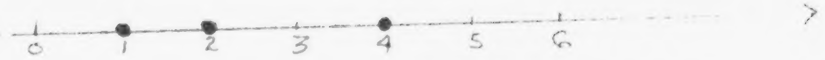
b.


c.


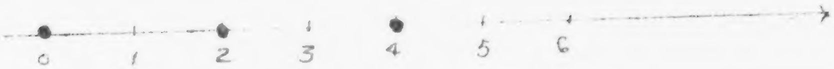
*d.


Given:

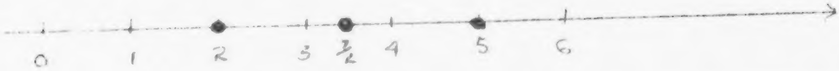
a.



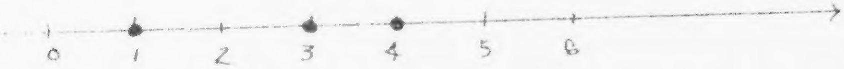
b.



c.



d.



Choose the graph you would use as the best graph of each of the following sets and fill in the appropriate letter associated with the graph on your answer sheet.

$\{1, 3, 4\}$ * d 1407

$\{0, 2, 4\}$ * b 1408

$\{2, 7/2, 5\}$ * c 1409

THE STUDENT SHOULD BE ABLE TO DIFFERENTIATE BETWEEN NUMERALS INDICATED SUMS, INDICATED DIFFERENCES, INDICATED PRODUCTS AND INDICATED QUOTIENTS BY CLASSIFYING GIVEN NUMERALS AND NUMERICAL PHRASES. (6) 0009

Given:
a. numeral
b. indicatd sum
c. indicated difference
d. indicated product
e. indicated quotient

Choose one of the above to classify the following expressions and fill in the appropriate letter associated with the statement on your answer sheet.

3 · 4 1410

a.
b.
c.
*d.
e.

6 + 7 1411

a.
*b.
c.
d.
e.

2.5 1412

*a.
b.
c.
d.
e.

1413

14 - 6

a.
b.
*c.
d.
e.

1414

9 ÷ 3

a.
b.
c.
d.
*e.

1415

LX

*a.
b.
c.
d.
e.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE THE RELATIONSHIP BETWEEN NUMERAL AND NUMBER BY CHOOSING A SIMILIAR ANALOGY. (1) 0211

A numeral relates to a number in the same way ink relates to... 1102

a. a pen
b. a page
c. an ink bottle
*d. a thought

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF STANDARD NOTATION OF NUMERALS BY MATCHING A GIVEN NUMERAL AND THE NUMERAL WRITTEN IN STANDARD NOTATION. (3) 0423

1. Write 17.3 in standard notation. 1649

a. 17.3×10^{0}
*b. 1.73×10^{1}
c. $.173 \times 10^{2}$
d. 1.73×10^{-1}

2, Write .000892 in standard notation. 1650

a. 0.0892×10^{-2}
b. 0.892×10^{-3}
*c. 8.92×10^{-4}
d. 8.92×10^{4}

3. Write 5/8 in standard notation. 1651

a. $.625 \times 10^{0}$
b. 6.25×10^{1}
c. 62.5×10^{-2}
*d. 6.25×10^{-1}

THE STUDENT CAN SHOW AN UNDERSTANDING OF THE BASE-PLACE NUMERAL BY CHOOSING THE CORRECT EQUATION FORM THAT EQUALS SUCH A NUMERAL. (3) 0449

1. Choose the answer which correctly defines the decimal numeral 2046. 1727

*a. $2046 = 2 \times 1000 + 4 \times 10 + 6 \times 1$
b. $2046 = 2000 \times 1000 + 40 \times 10 + 6 \times 1$
c. $2046 = 2 \times 1000 \times 4 \times 10 \times 6 \times 1$
d. $2046 = 2000 \times 40 \times 6$
e. $2046 = 20 \times 4 \times 6$

2. Choose the answer which correctly defines the decimal numeral 291.53. 1728

a. $2 \times 9 \times 1 \times \frac{5}{10} \times \frac{3}{100}$

b. $200 \times 90 \times 1 \times \frac{5}{10} \times \frac{3}{100}$

*c. $2 \times 100 + 9 \times 10 + 1 \times 1 + 5 \times 1/10 + 3 \times 1/100$

d. $200 \times 91 \times \frac{53}{100}$

e. 291×53

3. Choose the answer which correctly defines the base 8 numeral 263_8 1729

a. $2 \times 80 + 6 \times 8 + 3 \times 1$

b. $200 + 48 + 3$

*c. $2 \times 8^2 + 6 \times 8^1 + 3 \times 8^0$

d. $2 \times 8^2 + 6 \times 8 + 3 \times 1/8$

e. $2_8 \times 6_8$ c 3_8

THE STUDENT DEMONSTRATES HIS ABILITY TO MULTIPLY AND/OR DIVIDE RATIONAL NUMBERS BY CHOOSING THE CORRECT QUOTIENT OR PRODUCT. (4) 0093

Select the quotient: $\frac{x - 1}{5} \div \frac{x - 1}{10}$ 0223

a. $\frac{x^2 - 2x + 1}{50}$

*b. 2

c. $\frac{1}{2}$

d. $\frac{5x - 5}{2}$

Divide $\frac{am^2 - an^2}{bx + by}$ by $\frac{am + an}{b^2 + cb}$ 0224

a. $\frac{m + n}{x + y}$

b. $\frac{a}{m + n}$

*c. $\frac{(m-n)\ (b+c)}{x + y}$

d. $\frac{b + c}{m + n}$

Simplify $\frac{3a + 6c}{9a} \cdot \frac{12\ ac}{a^2 - 4c^2} \div \frac{18a^3\ c^3}{2a - 4c}$ 0225

*a. $\frac{4}{9a^3\ c^2}$

b. $\frac{a + 2c}{a - 2c}$

c. $\frac{3ac}{2}$

d. $\frac{a - 2c}{3a^2}$

Find the product of $\frac{x^2 + 3x}{x^2 + 2x - 3} \cdot \frac{x + 1}{x}$ 0226

*a. $\frac{x + 1}{x - 1}$

b. $\frac{x + 3}{x}$

c. $\frac{x + 1}{x + 3}$

d. $\frac{x}{x - 1}$

THE STUDENT EXHIBITS HIS ABILITY TO ADD AND/OR SUBTRACT RATIONAL EXPRESSIONS BY CHOOSING THE CORRECT SIMPLIFIED SUM OR DIFFERENCE.(3) 0094

Simplify: $\frac{x + 1}{x - 1} + \frac{3}{x^2 - 2x + 1} - \frac{3x + 4}{x^2 + x - 2}$ 0227

a. $\frac{x^3 - 3x + 4}{(x - 1)(x - 2)(x - 1)}$

b. $\frac{4x + x^2}{(x + 1)(x-2)(x-1)}$

c. $\frac{(3x + 4)(x - 1)}{(x+2)(x-1)(x-1)}$

*d. $\frac{x^3 - x^2 + x + 8}{(x-1)(x-1)(x+2)}$

Subtract $\frac{5}{2T - 2}$ from $\frac{T + 4}{2T^2 - 2T}$ 0228

a. $\frac{T-1}{2T}$

*b. $\frac{-2}{T}$

c. $\frac{1 + T}{2T(T-1)}$

d. $\frac{1 - T}{2(T + 1)}$

Simplify $\left(\frac{9y}{y^2 - 9} + \frac{3}{3 - y}\right) \frac{y^2 - y - 6}{2y + 3}$ 0229

a. $\frac{3(y + 2)}{y + 3}$

b. $\frac{(2y - 3)(y - 3)}{(2y + 3)(y+2)}$

*c. $\frac{3(2y - 3)(y + 2)}{(2y + 3)(y + 3)}$

d. $\frac{3(x - 2)}{y + 1}$

THE STUDENT DEMONSTRATES HIS ABILITY TO USE THE PROPERTY OF BETWEENESS OF RATIONAL NUMBERS BY SELECTING THE RATIONAL NUMBER FULFILLING GIVEN CONDITIONS. (4) 0075

$\frac{a}{b} > \frac{c}{d}$ if and only if $ad > cb$ and $b > 0$, $d > 0$. Using this statement, which of the following responses is correct? 0149

a. $\frac{7}{15} > \frac{7}{16}$

b. $\frac{19}{12} > \frac{56}{35}$

*c. $\frac{12}{13} > \frac{11}{12}$

d. $\frac{12}{25} > \frac{22}{25}$

Given the set $\left\{\frac{1}{2}, \frac{4}{9}, \frac{16}{31}\right\}$, which of the following responses has the given set arranged in increasing order? 0150

a. $\left\{\frac{1}{2}, \frac{16}{31}, \frac{4}{9}\right\}$

*b. $\left\{\frac{4}{9}, \frac{1}{2}, \frac{16}{31}\right\}$

c. $\left\{\frac{16}{31}, \frac{4}{9}, \frac{1}{2}\right\}$

d. $\left\{\frac{16}{31}, \frac{1}{2}, \frac{4}{9}\right\}$

The number one-third of the way from $\frac{7}{8}$ to $1\frac{1}{4}$ is 0151

a. $\frac{13}{16}$

b. $\frac{14}{16}$

c. $\frac{15}{16}$

*d. $\frac{16}{16}$

The number one fifth of the way from $-\frac{3}{2}$ to $-\frac{1}{4}$ is 0152

*a. $-\frac{5}{4}$

b. $-\frac{6}{4}$

c. $-\frac{4}{4}$

d. $-\frac{3}{4}$

THE STUDENT WILL BE ABLE TO RECOGNIZE RATIONAL AND IRRATIONAL NUMBERS BY SELECTING THE CORRECT DESCRIPTION FOR A GIVEN NUMBER. (8) 0185

The number $.1\overline{5}$ is 0624

*a. Rational
b. Irrational
c. Zero
d. Undefined

The number $4.130\overline{0}$ is 0625

*a. Rational
b. Irrational
c. Zero
d. Undefined

The number 0/380 is 0626

a. Rational
b. Irrational
*c. Zero
d. Undefined

The number 4.131331333 ··· is 0627

a. Rational
*b. Irrational
c. Zero
d. Undefined

The number 4.3666 ··· is 0628

*a. Rational
b. Irrational
c. Zero
d. Undefined

The number $\frac{16}{5-5}$ is 0629

a. Rational
b. Irrational
c. Zero
*d. Undefined

The number $\sqrt{64}$ is 0630

*a. Rational
b. Irrational
c. Zero
d. Undefined

The number $\sqrt{81}$ is 0631

*a. Rational
b. Irrational
c. Zero
d. Undefined

THE STUDENT WILL BE ABLE TO RECOGNIZE AND CLASSIFY NUMBERS ACCORDING TO REAL, RATIONAL, IRRATIONAL AND INTEGERS BY CHOOSING THE CORRECT DESCRIPTION FOR A GIVEN NUMBER. (10) 0200

Directions: Write the letter representing the correct answer in the blank provided.

c	0	a. real, rational number	0721
b	$\sqrt{8}$	b. real, irrational number	0722
a	$-\sqrt{\frac{4}{9}}$	c. real, rational integer number	0723
d	$\sqrt{-16}$	d. none of the above	0724
a	$\frac{4}{7}$		0725
b	$\sqrt{\frac{2}{4}}$		0726
b	π		0727
a	$\frac{72}{6}$		0728
c	$\sqrt{64}$		0729
a	10.40		0730

THE STUDENT WILL DEMONSTRATE KNOWLEDGE OF NUMBER CLASSIFICATIONS BY CLASSIFYING A NUMBER AS BEING REAL, RATIONAL, IRRATIONAL, INTEGRAL OR A COMBINATION THEREOF. (7) 0213

The following are the classifications into which numbers can be placed:

I. Real numbers
II. Rational numbers
III. Irrational numbers
IV. Integers

Directions: Select the best answer to each of the following questions on the basis of the above classifications.

"π" is an example of a(n) 1106

a. I and II
*b. I and III
c. II and III
d. II and IV
e. none of the above

"5" is an example of a(n) 1107

*a. I, II and IV
b. I, II and III
c. I and IV
d. I and II
e. none of the above

"$\frac{2}{3}$" is an example of a(n) 1108

a. I and IV
b. II and IV
c. I and III
*d. I and II
e. None of the above

"$\sqrt{4}$" is an example of a(n) 1109

a. I and III
b. I, III, IV
*c. I, II, IV
d. I and II
e. none of the above

"$\sqrt{7}$" is an example of a(n) 1110

*a. I and III
b. I, III, IV
c. I, II, IV
d. I and II
e. none of the above

"0" is an example of a(n) 1111

a. I and II
b. I and III
*c. I, II, IV
d. III and IV
e. none of the above

"8 + 3" is an example of a(n) 1112

a. I and IV
*b. I, II, IV
c. I and II
d. III and IV
e. none of the above

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF AN IRRATIONAL NUMBER BY CHOOSING *THE* IRRATIONAL NUMBER CONTAINED IN A LIST. (2) 0372

1. Which one of the following numbers is irrational? 1491

a. $\sqrt{1.69}$

b. 1.732

c. $4\sqrt{16}$

*d. $\sqrt{24}$

2. Which of the following numbers is irrational? 1492

a. 7.42374

*b. 5.010010001 . . .

c. 8.123123. . .

d. 17/24

THE STUDENT WILL SHOW HIS KNOWLEDGE OF INTEGERS BY CLASSIFYING THOSE ELEMENTS IN A GIVEN SET AS INTEGERS. (1) 0558

1. Consider set A = $\{-1, 0, +3, -5/2, 8/4, \sqrt{16}, \sqrt{-4}, \sqrt{3}, 1.123785..., 1.1232323...\}$ how many elements in A are integers? 2022

a. 2
b. 3
c. 4
*d. 5

THE STUDENT CAN IDENTIFY THE PROPERTIES OF NUMBERS BEING USED IN A PROBLEM SITUATION, THUS DEMONSTRATING KNOWLEDGE OF NUMBER PROPERTIES. (3) 0224

Directions: Select the best possible answer.

The expression 5 (2+11) = 55+10 is true because of 1148

a. C.A.
b. C.M.
c. D.P.
*d. none of these

The expression x + (y + z) = (y + z) + x is true because of 1149

a. A – A
*b. C – A
c. both A and B
c. none of these

If x = y then ax = ay illustrates 1150

a. mult. identity
*b. multiplication axiom
c. D.P.
d. none of these

THE STUDENT CAN IDENTIFY THE PROPERTIES OF NUMBERS THAT JUSTIFY THE TRUTH OF GIVEN STATEMENTS, THUS DEMONSTRATING KNOWLEDGE OF NUMBER PROPERTIES. (4) 0225

The property that justifies $5(\frac{1}{5}x) = (5 \cdot \frac{1}{5})x$ being true is the ... 1151

*a. associative property of multiplication
b. mult. inverse property
c. reciprocal property
d. all of the above
e. none of the above

The statement $2 \cdot 3 + 2 \cdot 5 = (3 + 5)2$ is true because of the... 1152

a. commutative property of multiplication
b. commutative property of addition
c. distributive property
*d. a and c
e. b and c

The statement $5 + (3+11) = 3 + (5 + 11)$ is true because of the ... 1153

a. associative property of addition
b. commutative property of addition
*c. rearrangement property of addition
d. none of the above

The statement $5 \div 3 = 5 \cdot \frac{1}{3}$ is true because of the... 1154

a. multiplicative inverse
*b. definition of division
c. uniqueness of division
d. none of the above

THE STUDENT CAN APPLY THE PROPERTIES OF THE REAL NUMBER SYSTEM TO A NEW OPERATION BY SELECTING THE PROPERTY THAT APPLIES TO THE NEW OPERATION. (1) 0226

The operation $x \neq y$ is defined as $2x + 3y$. Which of the following properties of the real number system apply to it ? 1155

a. commutative property
b. associative property
c. identity of one property
d. all of the above
*e. none of the above

THE STUDENT CAN APPLY THE PROPERTIES OF THE REAL NUMBER SYSTEM BY CHOOSING SIMPLIFIED ALGEBRAIC EXPRESSIONS. (7) 0231

The expression $15x - (3x + x)$ in simplest form is ... 1167

a. $15x - 3$
b. $13x$
*c. $11x$
d. $12x$
e. none of the above

The expression $125x \div 5x$ in simplest form is ... 1168

a. $\frac{125x}{5x}$

b. $\frac{125}{5}$

*c. 25

d. all of the above

e. none of the above

The expression $-3(x + y) + 6[2(x + 2y) - 3(5x + y)]$ in simplest form is ... 1169

a. $-81x + 19y$
*b. $-81x + 3y$
c. $-6x + 18y$
d. none of the above

The expression $2x - [x - (1 - 2x)]$ in simplest form ... 1170

a. $3x - 1$
b. $x - 1$
c. $-1 - x$
*d. $1 - x$
e. none of the above

The expression $2x + 3x \cdot 5x - 2x$ in simplest form is ... 1171

a. $23x^2$

b. $23x$

c. $9x^2$

*d. $15x^2$

e. none of the above

The expression $\frac{8}{a} + \frac{3}{b} - \frac{11}{a} + \frac{6}{b}$ in simplest form is ... 1172

*a. $\frac{9}{b} - \frac{3}{a}$

b. $\frac{6}{ab}$

c. $\frac{-6}{ab}$

d. $\frac{-3}{a} - \frac{3}{b}$

e. none of the above

The expression $(6xy^2)(-3x^3y)\left(\frac{1}{6xy^2}\right)\left(\frac{-1}{3xy}\right)$ in simplest form is ... 1173

a. $-x^2$

*b. $+x^2$

c. +1

d. none of the above

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO APPLY THE IDENTITY AXIOMS OF REAL NUMBERS TO AN ABSTRACT OPERATION. (2) 0510

1. If a and b are real numbers and the operation * is defined as $a \cdot b = 2a + b$, then the identity element for the operation * is: 1898

a. 0
b. 1
*c. $-a$
d. $1/2a$
e. b

2. Study the following table for the operation #. The identity element for this operation is: 1899

#	1	2	3	4	5
1.	5	4	2	1	3
2.	3	1	5	2	4
3.	4	5	1	3	2
4.	1	2	3	4	5
5.	2	3	4	5	1

a. 1
b. 2
c. 3
*d. 4
e. 5

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF THE REAL NUMBER AXIOMS NEEDED TO FORM A FIELD BY ANALYZING MATHEMATICAL SYSTEMS AND SELECTING THOSE WHICH FORM A FIELD. (1) 0596

1. Select the mathematical system which forms a field. 2136

1. $\{0,1\}$
2. Residue class 6
*3. Rational numbers
4. Mod 5
5. Rotations of a square

THE STUDENT CAN INSERT THE PROPER TERM (GREATER THAN, LESS THAN, EQUAL TO) IN A NUMERICAL SENTENCE SO THAT THE SENTENCE IS TRUE, THUS DEMONSTRATING KNOWLEDGE OF ORDER PROPERTIES. (4) 0007

Instructions: Complete the following numerical sentence so that the resulting sentence is true.

$3 + 6$ _____ $7 + 4$ 1401

a. $>$
*b. $<$
c. $=$

$3 - (4 - 2)$ _____ $7 - 5$ 1402

a. $>$
*b. $<$
c. $=$

$8 \times 4 \div 2 + 1$ ___ $8 \times (4 \div 2) + 1$ 1403

a. $>$
b. $<$
*c. $=$

$\frac{1}{2} \div \frac{2}{3} \div \frac{3}{4}$ ——— $\frac{1}{2} \times 3 - 1 \times \frac{1}{2}$ 1404

a. $>$
b. $<$
*c. $=$

THE STUDENT WILL APPLY HIS KNOWLEDGE OF COMPARING UNIT PRICES BY DETERMINING WHICH OF TWO ITEMS IS THE *BETTER BUY*. (1) 0478

1. A 6 oz. jar of Sam's grape jelly costs 39¢ and a 14 oz. jar of Sam's grape jelly costs 72¢. Which is the better buy and why? 1785

a. the 14 oz. jar because it is larger.
b. the 14 oz. jar because each ounce is cheaper.
c. the 6 oz. jar because it is cheaper.
*d. the 6 oz. jar because each ounce is cheaper.
e. neither is a better buy.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO INTERPRET THE SYMBOLS FOR GREATER THAN, LESS THAN, OR ABSOLUTE VALUE WITH VARIABLES BY DETERMINING THE TRUTH OR FALSITY OF GIVEN STATEMENTS. (4) 0489

Let p represent any positive real number. Then classify each statement below in terms of this key:

a. will mean statement is definitely true
b. will mean information given is not sufficient to indicate whether statement is true or false.
c. will mean statement is definitely false.

1. $-p < -n$ 1812

*a.
b.

2. /n/ < p 1813

a.
*b.
c.

3. p> -n 1814

a.
*b.
c.

4. p> -/n/ 1815

*a.
b.
c.

THE STUDENT CAN DETERMINE THE ABSOLUTE VALUE OF REAL NUMBERS DEMONSTRATING KNOWLEDGE OF THE MEANING OF THE TERM. (3) 0229

$-|-3|$ is ... 1161

a. 3
*b. -3
c. both of above
d. none of the above

$|y|$ is ... 1162

a. y if y is any number
b. y if $y > 0$
*c. y if $y > 0$, $-y$ if $y < 0$
d. none of the above

What is the relationship between $|x+y|$ and $|x| + |y|$? 1163

a. $|x+y| = |x| + |y|$
b. $|x+y| > |x| + |y|$
c. $|x+y| < |x| + |y|$
*d. none of the above

THE STUDENT CAN TRANSLATE EQUIVALENT PARTS OF A STATEMENT INVOLVING ABSOLUTE VALUE BY IDENTIFYING THE STATEMENT THAT IS EQUIVALENT AND FREE OF ABSOLUTE VALUES. (1) 0369

1. Rewrite the following statement $/x/ + 4 = /9/$ free of absolute values. 1487

a. $x + 4 = 9$ and $x + 4 = -9$

b. $-x + 4 = 9$ and $-x + 4 = -9$

*c. $x + 4 = 9$ and $-x + 4 = 9$

d. $x + 4 = 9$ and $x - 4 = 9$

THE STUDENT WILL BE ABLE TO IDENTIFY EXAMPLES OF THE BINARY OPERATIONS OF NUMBERS BY CHOOSING THE CORRECT OPERATION FOR A GIVEN EXAMPLE. (8) 0180

Directions: Match the letter representing the correct answer in the blank provided. (Note: Answers can be used more than once or not at all.)

b	$4 + 3 = 3 + 4$	a. Associative	0593
d	$X = (-X) = 0$	b. Commutative	0594
c	$6 + 14 = 2 (3 + 7)$	c. Distributive	0595
b	$4 (5 \times 2) = 4 (2 \times 5)$	d. Additive inverse	0596
a	$(4 \times 5) \times 2 = 4 \times (5 \times 2)$	e. Multiplicative inverse	0597
e	$3(1/3) = 1$	f. None of these	0598
c	$4x + 6y = 2(2x + 3y)$		0599
c	$-1(3 + y) = -3 -y$		0600

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF ADDITION RULES BY SELECTING THE SUM OF GIVEN NEGATIVE NUMBERS. (1) 0219

The sum of (-3) + (-5) is 1132

*a. -8
b. -2
c. +8
d. +2
e. None of these

THE STUDENT CAN ADD SIGNED NUMBERS THUS DEMONSTRATING KNOWLEDGE OF THE RULES FOR SUCH OPERATIONS. (2) 0227

The sum of (-3) + (16) is ... 1156

a. -13
b. +19
*c. 13
d. -19
e. none of the above

The sum of (24) + (-9) + (13) + (-20) is ... 1157

*a. 8
b. +66
c. -66
d. none of the above

THE STUDENT CAN SHOW HIS UNDERSTANDING OF THE COMMUTATIVE AXIOM OF ADDITION BY SELECTING IT AS THE REASON FOR REWRITING A GIVEN STATEMENT OR REWRITING A GIVEN STATEMENT ACCORDING TO IT. (2) 0371

1. The statement $(x + y)z + w = (y + x)z + w$ illustrates 1489

a. the associative axiom of multiplication.
*b. the commutative axiom of addition.
c. the commutative axiom of multiplication.
d. the associative axiom of addition.

2. The statement $(x + y)z + w$ can be written in one of the following forms by applying the commutative property of addition. 1490

a. $z(x + y) + w$
b. $x + yz + w$
c. $xz + yz + w$
*d. $w + (x + y)z$

THE STUDENT CAN SUBTRACT SIGNED NUMBERS THUS DEMONSTRATING KNOWLEDGE OF THE RULES FOR THIS OPERATION. (3) 0228

The difference (-16) - (+3) is ... 1158

a. -13
*b. -19
c. + 19
d. +13
e. none of the above

The difference (25) - (-11) is... 1159

a. 14
b. 24
c. -14
d. -36
*e. none of the above

The difference (11) - (-3) - (-5) is... 1160

a. 3
b. 9
c. -19
*d. 19
e. none of the above

THE STUDENT CAN EVIDENCE HIS COMPREHENSION OF THE RELATIONSHIP OF MULTIPLICATION TO ADDITION BY SELECTING THE PROPER PHRASE WHICH EXPLAINS THE MULTIPLICATION PROBLEM AS AN ADDITION PROBLEM AND VICE VERSA. (5) 0430

1. 3 x 5 means 1673

a. 5x5x5

b. 3+3+3

*c. 5+5+5

d. 3+5+3+5+3+5

e. 3x3x3

2. 4x6 means 1674

a. 6x6x6x6

b. 4+6+4+6+4+6+4+6

c. 4+4+4+4

*d. 6+6+6+6

e. 4x4x4x4

3. 3+3+3+3 means 1675

a. 3x3x3x3

b. 4x4x4

*c. 4x3

d. 3^4

e. 3x6+6

4. 2+2+2+2+2 means 1676

a. 2^4

b. 2x2x2x2x2

c. 5x5

*d. 5x2

e. 2x4+4

5. $3\frac{1}{2}$x2 means 1677

a. 3+3+$\frac{1}{2}$

b. 3+$\frac{1}{2}$+2

*c. $3\frac{1}{2}+3\frac{1}{2}$

d. 2x2x2x1

e. 3x3x$\frac{1}{2}$

THE STUDENT CAN DEMONSTRATE HIS COMPREHENSION OF THE RELATIONSHIP OF SUBTRACTION TO ADDITION BY SELECTING THE SUBTRACTION STATEMENT WHICH IS TRUE AS RELATED TO A GIVEN STATEMENT OF ADDITION. (2) 0431

1. If 5+3=8 then 1678

a. 5-8=3
*b. 8-5=3
c. 3-8=5
d. 5-3=8
e. 3-5=8

2. If $c+a=b$ then 1679

a. $a-c=b$

b. $a-b=c$

c. $c-b=a$

*d. $b-a=c$

e. $c-b=a$

THE STUDENTS WILL BE ABLE TO DETERMINE, WITHOUT ACTUAL DIVISION, IF A NUMBER IS DIVISIBLE BY 2, 3, 4, 5, 6, 9, 10 BY MATCHING A DESCRIPTION WITH A GIVEN NUMBER. (10) 0183

Directions: Match the letter representing the best answer in the blank provided.

b	15,603	a. The number is divisible by 2.	0611
f	58,132	b. The number is divisible by 3.	0612
g	106,530	c. The number is divisible by 4.	0613
h	144	d. The number is divisible by 5.	0614
f	9	e. The number is divisible by 9.	0615
h	72	f. 2 of the above answers	0616
f	516,704	g. three of the above	0617
f	2,671,305	h. four of the above	0618
f	7,983		0619
h	59,004		0620

THE STUDENT CAN MULTIPLY AND DIVIDE SIGNED NUMBERS, THUS DEMONSTRATING KNOWLEDGE OF THE RULES FOR SUCH OPERATIONS. (3) 0230

$(-123) \div (-3) = \ldots$ 1164

*a. 41
b. -41
c. $-\frac{1}{41}$
d. 369
e. none of the above

$(-11)(-4)(\frac{1}{4}) = \ldots$ 1165

*a. 11
b. -11
c. 176
d. -176
e. none of the above

$\frac{2}{3} \div -\frac{1}{5} \cdot 5 = \ldots$ 1166

a. $-\frac{50}{3}$

*b. $-\frac{2}{3}$

c. $-\frac{3}{2}$

d. none of the above

THE STUDENT CAN DEMONSTRATE HIS COMPREHENSION OF THE RELATIONSHIP OF DIVISION TO MULTIPLICATION BY SELECTING THE TRUE DIVISION STATEMENT AS RELATED TO A GIVEN MULTIPLICATION STATEMENT. (2) 0432

1. If $3 \times 15 = 45$ then 1680

a. $15 \div 45 = 3$
b. $15 \div 3 = 45$
c. $3 \div 45 = 15$
*d. $45 \div 3 = 15$
e. $3 \div 15 = 45$

2. If $m \times p = n$ then 1681

a. $p \div n = m$
*b. $n \div p = m$
c. $p \div m = n$
d. $m \div n = p$
e. $m \div p = n$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE THE PROCESS OF MULTIPLICATION BY IDENTIFYING A NUMBER THAT IS MISSING IN A PROBLEM. (1) 0474

1. Determine the value of $\square$ that would make the problem correct. 1777

$$\begin{array}{rr} & 4\,\square\,8 \\ \times & \underline{3\,2} \\ & 9\,5\,6 \\ & \underline{1\,4\,3\,4} \\ & 1\,5\,2\,9\,6 \end{array}$$

a. 5
*b. 7
c. 3
d. 2

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE OPERATIONS WITH DIRECTED NUMERALS BY GIVING THE CORRECT ANSWERS TO PROBLEMS. (11) 0629

1. (-3) + (-8) = 2245

a. -5
b. +5
*c. -11
d. +11

2. (-3) - (-8) = 2246

a. -5
*b. +5
c. -11
d. +11

3. (-15) ÷ (-3) = 2247

a. -5
*b. +5
c. +45
d. -45

4. (-3) + (+8) 2248

a. -5
*b. +5
c. -11
d. +11

5. (-3) - (+8) = 2249

a. -5
b. +5
*c. -11
d. +11

6. (-8) - (-3) = 2250

*a. -5
b. +5
c. -11
d. +11

7. (-8) + (-3) = 2251

a. -5
b. +5
*c. -11
d. +11

8. (-12) (-3) = 2252

a. -36
*b. +36
c. +4
d. -15

9. (12) (+3) = 2253

*a. -36
b. +36
c. -9
d. -4

10. (+15) ÷ (-3) = 2254

*a. -5
b. +5
c. +9
d. -45

11. (-3) (-8) (-1) = 2255

*a. -24
b. +24
c. -5
d. -6

THE STUDENT CAN ANALYZE A HYPOTHETICAL OPERATION BY PICKING FROM A SERIES OF CHOICES THE DEFINITION OF A HYPOTHETICAL OPERATION DEFINED IN TERMS OF OPERATIONS OF ARITHMETIC SO AS TO MAKE THE HYPOTHETICAL OPERATION A COMMUTATIVE OPERATION. (1) 0289

Let X be a binary operation, such that

$$x \; \textcircled{X} \; y = 2x + \underline{a}\, y.$$

For what value (s) of a is $\textcircled{X}$ a commutative operation. 1369

a. all real values
b. positive real values
*c. +2
d. −2
e. 1/2

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF IMAGINARY NUMBERS BY SELECTING CORRECT SIMPLIBICATIONS. (7) 0282

The reciprocal of 4i is ________. 1355

a. $\frac{1}{4}\, i$

b. $\frac{-1}{4i}$

*c. $\frac{1}{4i}$

d. $-\frac{1}{4}\, i$

For all integral values of K, which of the following expressions is equal to $-i$? 1359

a. i^{4K}

b. $i^{4K + 1}$

c. $i^{4K + 2}$

*d. $i^{4K + 3}$

The product of $(a + bi)$ and $(a - bi)$ is always a/an______. 1360

*a. real number
b. integer
c. rational number
d. complex number

The product of $(a + bi)$ and $(c + di)$ for all real values a, b, c, d, is ________. 1361

a. $ac + bdi$
*b. $(ac - bd) + (ad + bc) i$
c. $ac + bdi^2$
d. $ac = bd$
e. $ac + adi + bc\ i + bd\ i^2$

THE STUDENT DISPLAYS HIS ABILITY TO PERFORM ANY OF THE FUNDAMENTAL OPERATIONS OVER THE SET OF COMPLEX NUMBERS BY CHOOSING THE RESULT OF A GIVEN OPERATION. (3) 0138

The simplified form of i^{1955} is _____. 1356

a. i

b. i^3

*c. $-i$

d. i^2

e. -1

$i + i^2 + i^3 + i^4$ is equal to ________. 1357

*a. 0

b. i

c. $-i$

d. i^{10}

e. $+1$

The simplified form of $(\frac{1}{3}\sqrt{5}\ i)^2$ is ______. 1358

a. $\frac{5}{9} i$

b. $\frac{5}{9} i^2$

c. $\frac{5}{9} i$

*d. $-\frac{5}{9}$

Simplify $(7 + 3i) + (2 - 6i) - (7 - 2i)$ 0376

a. $9 - 5i$
b. $-7 + -2i$
c. $16 + 11i$
*d. $2 - i$

The product of $-\sqrt{-\frac{5}{4}}$ and $\sqrt{-\frac{1}{5}}$ is: 0377

a. $-\frac{i\sqrt{5}}{5}$

*b. $-\frac{1}{2}$

c. $\frac{i^2}{2}$

d. $-\frac{i\sqrt{5}}{2}$

Find the sum of $5\sqrt{-2} + \sqrt{-8}$ 0378

a. $14i$
b. $11i$
*c. $7i\sqrt{2}$
d. $6i\sqrt{10}$

THE STUDENT CAN TRANSLATE A COMPLEX NUMBER FROM A & BI FORM TO THE TRIGONOMETRIC FORM BY CHOOSING THE CORRECT ALTERNATE FORM. (1) 0300

The trigonometric form of the complex number 1386

$-\frac{1}{2} + \frac{1}{2}i$ is _______.

*a. $1 (\cos 135^\circ + i \sin 135^\circ)$

b. $1 (\cos 45^\circ + i \sin 45^\circ)$

c. $1/4 (\cos 225^\circ + i \sin 225^\circ)$

d. $1/4 (\cos 315^\circ + i \sin 315^\circ)$

e. none of the above

THE STUDENT CAN ANALYZE A PAIR OF COMPLEX NUMBERS BY SELECTING THE NECESSARY CONDITIONS TO DENOTE EQUALITY. (1) 0391

1. If a, b, c, and d denote real numbers, then the complex numbers a + b i and c + d i are equal if and only if 1540

a. $a = b$ and $c = d$
*b. $a = c$ and $b = d$
c. $a = d$ and $b = c$
d. $a \neq b$ and $c \neq d$

THE STUDENT CAN SHOW HIS KNOWLEDGE OF ADDITION IN THE SET OF COMPLEX NUMBERS BY SIMPLIFYING GIVEN COMPLEX NUMBERS. (2) 0394

1. Simplify: (4 + 2 i) + (8-3i) - (14 - 5 i). 1551

a. - 2 - 6 i
b. 26 + 4 i
c. 2 + 4 i
*d. -2 + 4 i

2. Simplify: - (5 - 4 i) + (6 + 2 i) - (- 5). 1552

a. -4 + 6 i
*b. 6 + 6 i
c. 6 - 2 i
d. -4 - 2 i

THE STUDENT CAN SHOW HIS UNDERSTANDING OF THE DEFINITION OF COMPLEX NUMBER BY IDENTIFYING A COMPLEX NUMBER IN STANDARD FORM. (2) 0396

1. Which of the following numbers is written in the standard form of the complex number? 1556

*a. 4 + 0 i
b. 4 i
c. 0 i + 4
d. [4, 0]

2. Which of the following numbers is written in the standard form of the complex number? 1557

a. [4, 3]
b. 3 i + 4
*c. 4 + 3 i
d. [3, 4]

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF MULTIPLICATION OF COMPLEX NUMBERS BY WRITING THE RESULTS OF PRODUCTS IN SIMPLEST FORM. (6) 0398

1. Express in simplest form the product of 7 i and 5 i. 1559

a. 35 i
*b. −35
c. 35 i^2
d. −35 i

2. Express in simplest form the product of $\sqrt{169} \cdot \sqrt{-5}$. 1560

a. 65 i
b. − 13 $i\sqrt{5}$
c. −65 i
*d. 13 $i\sqrt{5}$

3. Express in simplest form the product of $6\sqrt{-10} \cdot 7\sqrt{-8}$. 1561

*a. − $168\sqrt{5}$
b. $168\sqrt{5}$
c. $42\, i^2\sqrt{80}$
d. − $42\sqrt{80}$

4. Express the product of (2 + 7i) and (7 + 3 i) in simplest terms. 1562

a. 35 + 55 i
b. 14 + 55i + 21 i^2
*c. − 7 + 55 i
d. 47

Express the product of $(4 - 3i)$ and $(2i - 5)$ in simplest terms. 1563

a. $- 20 + 23i - 6i^2$
*b. $-14 + 23i$
c. $-26 + 23i$
d. $-14 - 7i$

6. Express $(4 - 5i)^2$ in simplest terms. 1564

a. $16 + 25i^2$
b. $- 9$
*c. $- 9 - 40i$
d. $41 - 40i$

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF DIVISION OF COMPLEX NUMBERS BY WRITING THE RESULTING QUOTIENTS IN SIMPLEST OR STANDARD FORM. (4) 0406

1. Express in simplest form the quotient of $-64i$ divided by $-16i$. 1583

a. -4
b. $4i$
c. $-4i$
*d. 4

2. Express in simplest form the quotient of $15\sqrt{-14}$ divided by $3\sqrt{-7}$. 1584

a. $5i\sqrt{2}$
*b. $5\sqrt{2}$
c. $-5\sqrt{2}$
d. $-5i\sqrt{2}$

3. Express $\frac{13i}{i + 3}$ in standard form. 1585

*a. $\frac{13}{10} + \frac{39}{10}i \ i$

b. $\frac{13 + 39i}{10}$

c. $\frac{13}{10} - \frac{39}{10}i \ i$

d. $\frac{13 - 39i}{10}$

4. Express $\frac{1 - 5i}{i}$ in standard form. 1586

a. $\frac{1}{i} - 5$

*b. $-5 - i$

c. $5 + i$

d. $\frac{-5 + i}{-1}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY DE MOIVRE'S THEOREM TO COMPLEX NUMBERS, BY CALCULATING POWERS OF COMPLEX NUMBERS. (3) 0551

1. The expression $(\cos. \pi/4 + i \sin \pi/4)$ is equivalent to 2002

a. $8(\cos. 2\pi + i \sin 2\pi)$
b. $1/16(\cos. 2\pi + i \sin 2\pi)$
c. $8(\cos \pi/4 + i \sin \pi/4)$
d. $1(\cos. \pi/4 - i \sin \pi/4)$
*e. $(\cos. 2\pi + i \sin 2\pi)$

2. The expression $(\sqrt{3} + i)^{12}$ is equivalent to 2003

a. 1

*b. 2^{12}

c. $3^6 + 1$

d. 0

3. The expression $[2(\cos. 7\pi/4 + i \sin 7\pi/4)]^5$ is equivalent to 2004

*a. $-16\sqrt{2} + 16i\sqrt{2}$

b. $-16\sqrt{2} - 16i\sqrt{2}$

c. $16\sqrt{2} - 16i\sqrt{2}$

d. $-\frac{\sqrt{2}}{2} + i\sqrt{2}/2$

e. $\sqrt{2}/2 - i\sqrt{2}/2$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY HIS KNOWLEDGE OF MONEY AND SUBTRACTION BY DETERMINING THE LEAST POSSIBLE NUMBER OF BILLS AND COINS TO BE GIVEN AS IN A TRANSACTION. (3) 0480

1. Mr. Jones purchased groceries totaling $3.52 and gave the clerk $5.00. What is the least possible number of bills and coins he should be given for change? 1791

a. 9
*b. 7
c. 8
d. 6
e. 10

2. Mr. Jones purchased a box of soap costing 57¢ with tax. He gave the clerk a $10.00 bill. What is the least possible number of bills and coins he should be given for change? (the clerk has no $2 bills or half dollars.) 1792

a. 13
b. 10
*c. 11
d. 12
e. 15

3. Mr. Jones purchased some groceries and gave the clerk a $5.00 bill. The clerk have him his change whtch consisted of two $1.00 bills and five coins. His groceries cost______. (The clerk has no half dollars.) 1793

a. $3.53
b. $2.33
c. $3.77
d. $2.37
*e. $2.77

THE STUDENT WILL SHOW HIS COMPREHENSION OF STATEMENTS RELATING TO ODD INTEGERS, EVEN INTEGERS, COUNTING NUMBERS, LESS THAN, GREATER THAN, MULTIPLES OF, AND DIVISIBLE BY, BY SELECTING SETS WHICH REPRESENT GIVEN VERBAL DESCRIPTIONS. (4) 0553

1. Which of the following sets represent the set of counting numbers greater than 8 and less than 13 ? 2010

a. {8,9,10,11, 12}

*b. {9,10,11,12}

c. {8,9,10,11,12,13}

d. {9,10,11,12,13}

2. Which of the following sets represents the set of counting numbers that are odd and less than 9 ? 2011

a. $\{1,3,5,7,9\}$

*b. $\{1,3,5,7\}$

c. $\{...-3,-1,1,3,5,7\}$

d. $\{...-3,-1,1,3,5,7,9\}$

e. $\{1,2,3,4,5,6,7,8\}$

3. Which of the following sets represents the set of counting numbers that are multiples of 3 and less than 400? 2012

a. $\{0,3,6,9,...,399\}$

*b. $\{3,6,9,12,...,399\}$

c. $\{...-9.-6,-3,0,3,6,...,399\}$

d. $\{3,6,9,...,400\}$

4. Which of the following sets represents the integers greater than or equal to -11 ? 2013

a. $\{...,-12,-11\}$

b. $\{...,-13,-12\}$

*c. $\{-11,-10,...\}$

d. $\{-10, -9,...\}$

THE STUDENTS WILL BE ABLE TO TRANSLATE NUMBERS INTO SCIENTIFIC NOTATION BY CHOOSING THE CORRECT NOTATION FOR A GIVEN NUMBER.(3) 0184

The number 34,500 expressed in scientific notation is 0621

a. 34.5×10^3

b. 34.5×10^2

c. 3.45×10^3

*d. 3.45×10^4

e. None of above

The number .0437 expressed in scientific notation is 0622

a. $.0437 \times 10^{-1}$

b. $.437 \times 10^{-2}$

c. $.437 \times 10^0$

*d. 4.37×10^{-2}

e. 4.37×10^{-3}

The number 3.150 expressed in scientific notation is 0623

a. 3.150×10^{-1}

*b. 3.150×10^0

c. 3.150×10^1

d. 31.50×10^2

e. none of the above

THE STUDENT WILL BE ABLE TO REWRITE A DECIMAL NUMBER GREATER THAN ZERO IN SCIENTIFIC NOTATION WHEN HE CHOOSES THE CORRECT NOTATION FOR A GIVEN NUMBER . (3) 0212

The number 53.762 written in scientific notation is ... 1103

a. 5.3762×10^4

b. $.53762 \times 10^5$

c. 53.762×10^3

*d. 5.3762×10^1

e. none of the above

When 856.3 is written in scientific notation, the exponent of 10 will be ... 1104

a. 1
*b. 2
c. 3
d. 4
e. none of the above

The number 309,000,000 written in scientific notation is ... 1105

*a. 3.09×10^8

b. 3.09×10^2

c. 3.09×10^6

d. 3.09×10^9

e. none of the above

THE STUDENT CAN EVALUATE A PHRASE USING THE ORDER OF OPERATIONS BY CHOOSING THE COMMON NAME OF A NUMERICAL PHRASE. (3) 0006

The common name of the numerical phrase $5 \cdot 2 + 3 \cdot 4$ is 1398

a. 52
b. 70
*c. 22
d. 120

The common name of the numerical phrase $6 \cdot 8 \div 2 \cdot 4$ 1399

a. 24
b. 6
*c. 96
d. 48

The common name of the numerical phrase $9 = 12 \div 3 - 2 \cdot 4$ 1400

a. 20
b. 44
c. 84
*d. 13

GIVEN AN OPEN PHRASE AND THE DOMAIN OF THE VARIABLE, THE STUDENT SHOULD BE ABLE TO EVALUATE THE OPEN PHRASE BY CHOOSING THE CORRECT SET OF VALUES FROM A LIST. (2) 0012

Given that 0, 1, 2 is the domain of the variable of the open phrase $2(x + 5)$, the set of values of the open phrase is 1422

a. $\{7, 8, 9\}$

b. $\{9, 10, 11\}$

c. $\{10, 11, 12\}$

*d. $\{10, 12, 14\}$

Given that $\frac{1}{2}$, $\frac{1}{3}$, 2 is the domain of the variable of the open phrase $6 \cdot x + 2 \div x$, the set of values of the open phrase is 1423

*a. $\{7, 8, 13\}$

b. $\{7, 2\frac{2}{3}, 13\}$

c. $\{4, 2\frac{2}{3}, 13\}$

d. $\{4, 8, 13\}$

THE STUDENT CAN PERFORM ARITHMETIC COMPUTATIONS INVOLVING GROUPING SYMBOLS, THUS DEMONSTRATING KNOWLEDGE OF SIMPLE ARITHMETIC OPERATIONS. (3) 0223

The simplification of the expression $5(6-3) + 2$ is 1145

*a. 17
b. 29
c. 25
d. none of these

The simplification of the expression $3[(5-2)\ 3+4]$ is 1146

a. 63
b. 43
*c. 39
d. none of these

The simplification of the expression $4[11 - 2\ (3+1)]$ is 1147

a. 16
*b. 12
c. 144
d. none of these

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECALL THE RULE FOR ORDER OF OPERATIONS BY COMPUTING THE VALUE OF AN EXPRESSION. (1) 0486

1. State the value of: $7 \cdot 3 + 2 \cdot 8 - 3$ 1803

a. 181
*b. 34
c. 175
d. 91
e. 31

POINTS, LINES AND PLANES

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF INTERIOR POINTS OF A SEGMENT OR ANGLE, BY SELECTING FROM A LIST OF PROPERTIES THOSE WHICH DEFINE INTERIOR POINTS. (2) 0502

1. The interior of $\overline{AB}$ is 1849

a. $\{P \mid P\text{-}A\text{-}B\}$
*b. $\{P \mid A\text{-}P\text{-}B\}$
c. $\{P \mid A\text{-}B\text{-}P\}$
d. $\{P \mid A\text{-}P\text{-}B\} \cup \{A,B\}$
e. $\{P \mid A\text{-}P\text{-}B\} \cap \{A,B\}$

2. Given the $\angle ABC$ and A-P-C. Then: 1850

*a. P is in the interior of $\angle ABC$.
b. P is in the exterior of $\angle ABC$.
c. P is a point of $\angle ABC$ or its interior .
d. P is a point of ABC.
e. The information given is insufficient to reach any of the above conclusions.

THE STUDENT CAN RECALL THE MINIMUM CONDITIONS FOR EXACTLY DETERMINING A LINE, A PLANE OR SPACE BY CHOOSING THE NUMBER AND KIND OF POINT NECESSARY TO DEFINE A LINE, PLANE OR SPACE. (3) 0646

1. Space is exactly determined by 2495

a. 2 points
b. 3 non-collinear points
c. 3 non-coplanor points
*d. 4 non-coplanor points

2. A plane is exactly determined by 2496

a. 3 non-collinear points
b. one line and a point not on the line
c. two intersecting lines
*d. all of the above

3. A line is exactly determined by 2497

a. 1 point
*b. 2 distinct points
c. a plane
d. space

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF CONVEX SETS AND PARTITION OF A SET BY FINDING THE GREATEST NUMBER OF NON-INTERSECTING CONVEX SETS DETERMINED BY A LINE IN A PLANE. (1) 0504

1. What is the greatest number of non-intersecting convex sets determined by a line in a plane? 1854

a. 0
b. 1
c. 2
*d. 3
e. 4

THE STUDENT CAN SHOW HIS UNDERSTANDING OF PARALLEL LINES, BETWEEN LENGTH OF INTERCEPTED ARC, RADIUS OR CIRCLE, AND CENTRAL ANGLE BY CALCULATING THE VALUE OF ONE WHEN THE OTHER TWO ARE GIVEN. (1) 0584

1. If two parallel lines are cut be a transversal and the interior angles on the same side of the transversal are bisected then the bisectors____________. 2086

a. are parallel
b. intersect and form an acute angle
*c. intersect and form a right angle
d. intersect and form an obtuse angle
e. intersect but the angle could be any size.

2. If two parallel lines are cut by a transversal and a pair of corresponding angles are bisected then the bisectors ____________. 2087

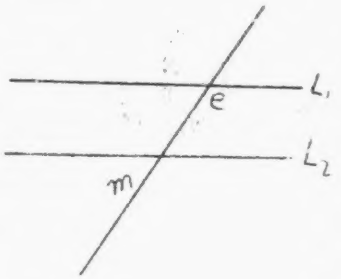
*a. are parallel
b. intersect and form an acute angle
c. intersect and form a right angle
d. intersect and form an obtuse angle
e. intersect but the angle formed could be any size.

3. If two parallel lines are cut by a transversal the rays bisecting a pair of alternate interior angles is__________. 2088

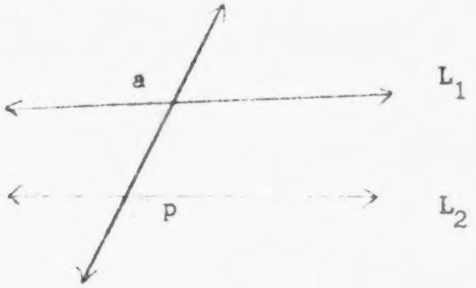
*a. parallel
b. intersecting but oblique
c. perpendicular
d. skew
e. cannot be determined from the given information

4. If m ∠m = 65° and m ∠e = 105°, then L_1 and L_2 are________. 2089

a. parallel
*b. intersecting
c. skew
d. cannot be determined from the given information



5. If $m\angle a = 100^\circ$ and $m\angle P = 100^\circ$, then L_1 and L_2 are _____. 2090



- *a. parallel
- b. intersecting
- c. skew
- d. cannot be determined from the given information

THE STUDENT WILL SHOW HIS UNDERSTANDING OF THE DEFINITION OF PARALLEL LINES, AND ALTERNATE INTERIOR ANGLES BY IDENTIFYING THE RELATIONSHIP OF GIVEN LINES OR ANGLES. (4) 0585

1. If two lines are coplanar and they do not intersect we say that they are ________. 2091

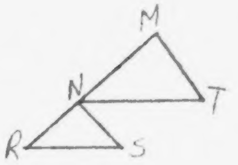
- a. skew
- *b. parallel
- c. collinear
- d. perpendicular

2. If two parallel lines are cut by a transversal, the interior angles on the same side of the transversal are________. 2092

- a. congruent angles
- *b. supplementary
- c. right angles
- d. acute angles

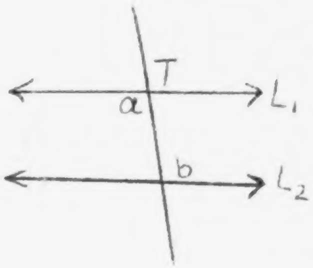
3. In the figure at the right, $\overline{NR} \cong \overline{NS}$, $\angle MNT = \angle NSR$, we can prove that__________. 2093

*a. $\overline{NT} \parallel \overline{RS}$
b. $\overline{NT} = \overline{RS}$
c. $\overline{NT} \perp \overline{MR}$
d. $NT = MT$



4. In the drawing at the right, if $L_1 \parallel L_2$. T intersect both L_1 and L_2, $\angle a$ and $\angle b$ are called________. 2094

a. supplementary angles
b. corresponding angles
*c. alternate interior angles
d. transversal angles



THE STUDENT WILL BE ABLE TO DEMONSTRATE COMPREHENSION OF PARALLELISM AND PERPENDICULARITY BY DETERMINING WHETHER OR NOT GENERAL STATEMENTS ARE ALWAYS TRUE, SOMETIMES TRUE, OR NEVER TRUE. (3) 0678

1. "If two lines are both parallel to the same line they are all parallel to each other." The above sentence is 2591

*a. always true
b. sometimes true
c. never true

2. "If two lines are both perpendicular to a third line two lines are parallel to each other." The above statement is 2592

a. Always true
*b. sometimes true
c. never true

3. If a line is perpendicular to one of two parallel lines it is perpendicular to the other also." The above statement is 2593

a. always true
*b. sometimes true
c. never true

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF SKEW LINES BY CHOOSING THE CORRECT PROPERTIES OF THE LINES. (1) 0690

1. Two skew lines may 2625

a. intersect
b. be in the same plane
*c. lie in different planes
d. all of the above
e. none of the above

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF THE DEFINITION OF PARALLELISM BY SELECTING STATEMENTS WHICH ARE TRUE OF PARALLEL LINES OR SEGMENTS. (2) 0706

1. Which of the following statements is not necessarily true? 2708

a. If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ then $\overleftrightarrow{AB} \cap \overleftrightarrow{CD} = \emptyset$

*b. If $\overline{AB} \wedge \overline{CD} = \emptyset$ then $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$

c. Parallel lines are straight lines

d. Parallel lines are coplanar

2. Segments $\overline{AB}$ and $\overline{CD}$ are said to be parallel if 2709

a. AB = CD

*b. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$

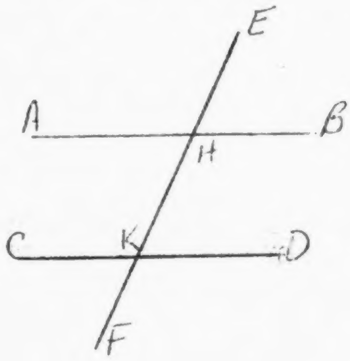
c. $\overline{AB} \cap \overline{CD} = \emptyset$

d. A and B are on the same side of $\overleftrightarrow{CD}$

THE STUDENT CAN APPLY THE PROPERTIES OF PARALLEL LINES TO SELECT TRUE STATEMENTS DESCRIBING A GIVEN FIGURE. (7) 0707

1. In the figure, if $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and $\overleftrightarrow{EF}$ intersects $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ at H and K respectively, then 2710

a. ∠BHE and ∠DKF are called corresponding angles
*b. $\angle AHE \cong \angle CKH$
c. ∠CKF and ∠EHB are called alternate interior angles
d. $\overleftrightarrow{AB} \cap \overleftrightarrow{CD} \neq \emptyset$



2. If $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are distinct lines and each is perpendicular to $\overleftrightarrow{EF}$, then 2711

a. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$
b. $\overleftrightarrow{AB}$, $\overleftrightarrow{CD}$ and $\overleftrightarrow{EF}$ are concurrent
c. $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are skew lines
*d. $\overleftrightarrow{AB}$ and $\overleftrightarrow{EF}$ are coplanar

3. If three distinct lines are each perpendicular to a plane then which of the following is not necessarily true? 2712

a. at least two of the lines are parallel
*b. the three lines are perpendicular to the same line
c. the feet of the perpendiculars are three different points
d. the three lines determine one plane or three planes

4. If ℓ is a transversal of two parallel lines then 2713

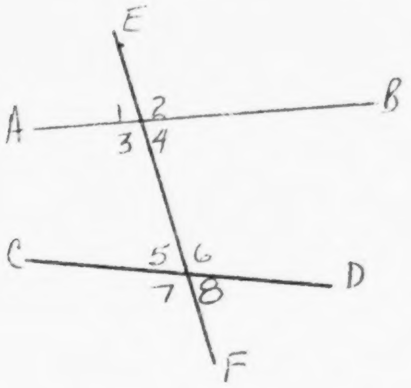
a. the alternate interior angles are supplementary
*b. the interior angles on the same side of the transversal are supplementary
c. the interior $\angle$s on the same side of the transversal are =
d. the corresponding angles are supplementary

5. If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and $EF \perp AB$, what additional information would be needed to conclude that $\overleftrightarrow{EF} \perp \overleftrightarrow{CD}$? 2714

a. no additional information is needed
*b. $\overleftrightarrow{EF}$ intersects $\overleftrightarrow{CD}$
c. $\overleftrightarrow{EF}$ and $\overleftrightarrow{CD}$ are skew lines
d. E is between A and B

6. In the figure formed by $\overleftrightarrow{AB}$, $\overleftrightarrow{CD}$ and $\overleftrightarrow{EF}$ a pair of corresponding angles are 2715

a. $\angle 1$ and $\angle 7$
b. $\angle 2$ and $\angle 5$
c. $\angle 4$ and $\angle 5$
*d. $\angle 2$ and $\angle 6$



7. The proof that the sum of the measures of the angles of a triangle is 180 depends most on 2716

*a. the parallel postulate
b. the altitude of a triangle is perpendicular to one side of the Δ
c. two coplanar lines perpendicular to the same line are parallel
d. parallel lines are coplanar

THE STUDENT DEMONSTRATES HIS ABILITY TO DESCRIBE A HALF-PLANE WHEN HE CHOOSES THE REPRESENTATION FOR A GIVEN LINE. (3) 0253

The description of the half-plane vertically below the line $y = 2x + 3$ is 1258

a. $y > 2x + 3$
*b. $y < 2x + 3$
c. $x > 2x + 3$
d. $x < 2x + 3$
e. b and c

The description of the half-plane horizontally to the left of $y = \frac{1}{-3x} + 2$ is 1259

*a. $y < -\frac{1}{3}x + 2$

b. $y > -\frac{1}{3}x + 2$

c. $x < -3y + 6$

d. $x < 3y - 2$

e. b and c

The graph can best be described as 1260

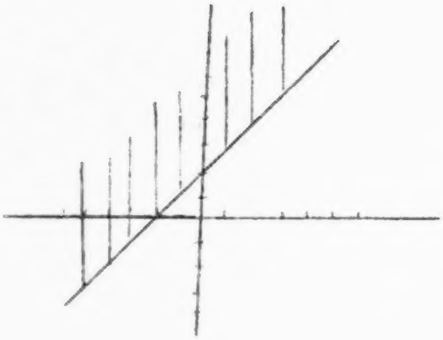
a. $\{(x,y) \mid y \geqq 2x + 2\}$

*b. $\{(x,y) \mid y \geqq x + 2\}$

c. $\{(x,y) \mid x \geqq y - 2\}$

d. $\{(x,y) \mid y > x + 2\}$

e. a and c



THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF PLANES BY CHOOSING WHETHER NO PLANES, ONE PLANE OR MANY PLANES ARE DETERMINED BY CERTAIN CONDITIONS. (6) 0691

1. Three non-collinear points 2626

a. do not lie in the same plane
*b. lie in one and only one plane
c. lie in infinitely many planes

2. A line and one point not on that line 2627

a. do not lie in the same plane
*b. lie in one and only one plane
c. lie in infinitely many planes

3. Six collinear points 2628

a. do not lie in the same plane
b. lie in one and only one plane
*c. lie in infinitely many planes

4. Two parallel lines 2629

a. do not lie in thesame plane
*b. lie in one and only one plane
c. lie in infinitely many planes

5. Two intersecting lines 2630

a. do not lie in the same plane
*b. lie in one and only one plane
c. lie in infinitely many planes

6. Two skew lines 2631

*a. do not lie in the same plane
b. lie in one and only one plane
c. lie in infinitely many planes

THE STUDENT WILL BE ABLE TO APPLY HIS KNOWLEDGE OF PLANES BY STATING THEIR INTERSECTIONS. (2) 0692

1. The intersections of two planes may be 2632

a. the null set
b. a line
c. a plane
*d. all of the above
e. B and C only

2. Two planes are parallel if the intersection is 2633

a. the null set
b. a line
c. a plane
d. A and B
*e. A and C

THE STUDENT CAN ANALYZE WHETHER GIVEN SETS OF POINTS AND LINES ARE COLLINEAR OR COPLANAR BY MATCHING THE SET WITH A DESCRIPTION. (10) 0201

Directions: Matching: Write the letter representing the best possible answer in the blank provided.

h	Two points	a. may be collinear	0731
f	Three points	b. must be collinear	0732
e	Four points	c. may be coplanar	0733
h	One line	d. must be coplanar	0734
d	Two intersecting lines	e. a and c	0735
d	Two parallel lines	f. a and d	0736
i	Two skew lines	g. b and c	0737
d	One line and 1 point not on the line	h. b and d	0738
e	One line and 2 points not on the line	i. none of the above	0739
d	Two perpendicular lines		0740

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF PROPERTIES WHICH DETERMINE PLANES OR LINES, BY SELECTING FROM A LIST OF SETS OF POINTS THOSE SETS WHICH DO (OR DO NOT) DETERMINE A PLANE OR LINE. (1) 0500

1. Which of the following sets of points in space does not determine a unique plane? 1847

a. three non-collinear points
b. an angle
*c. four non-collinear
d. intersecting lines
e. a line and a point not in the line

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF PROPERTIES WHICH DETERMINE LINES BY FINDING THE NUMBER OF LINES DETERMINED BY THREE DISTINCT POINTS. (1) 0501

1. How many lines are determined by 3 distinct points? 1848

a. 1
b. 2
*c. 1 or 3
d. 3
e. infinitely many

THE STUDENT WILL APPLY HIS KNOWLEDGE OF POINTS, LINES AND PLANES BY COUNTING THE NUMBER OF PLANES DETERMINED BY A GIVEN SET OF POINTS. (2) 0565

1. How many lines are there containing P and Q if P = Q? 2035

a. none
b. one
c. two
*d. none of the above

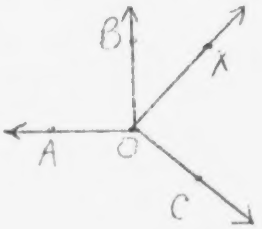
2. Give 4 distinct points in space the greatest number of lines that could be determined is (are)________. 2036

a. none
b. twelve
c. three
d. four
*e. six

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS UNDERSTANDING OF PLANES AND PERPENDICULAR LINES BY DETERMINING WHICH LINES ARE PERPENDICULAR TO WHICH PLANE. (3) 0693

1. If $\overrightarrow{OA} \perp \overrightarrow{OB}$, and $\overrightarrow{OX} \perp \overrightarrow{OB}$ then 2634

*a. $\overrightarrow{OB} \perp$ plane AOX
B. $\overrightarrow{OA} \perp$ plane BOX
c. $\overrightarrow{OX} \perp$ plane AOB
d. $\overrightarrow{OC} \perp$ plane AOB
e. none of the above



2. If $\overrightarrow{OC} \perp \overrightarrow{OA}$, and $\overrightarrow{OA} \perp \overrightarrow{OB}$ then 2635

a. $\overrightarrow{OB} \perp$ plane AOX
*b. $\overrightarrow{OA} \perp$ plane BOC
c. $\overrightarrow{OX} \perp$ plane AOB
d. $\overrightarrow{OC} \perp$ plane AOB
e. none of the above

3. How many different planes are determined by the adjacent figure if three rays are coplanar? 2636

a. 1
b. 3
*c. 4
d. 6
e. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO RECALL THE RELATIONSHIP BETWEEN PLANES AND LINES PERPENDICULAR TO THOSE PLANES, BY CHOOSING THE NUMBER OF LINES PERPENDICULAR TO A GIVEN PLANE OR THE NUMBER OF A PLANES PERPENDICULAR TO A GIVEN LINE. (4) 0694

1. How many planes in space are perpendicular to a given line? 2637

a. the empty set
b. one line
*c. an infinite number
d. none of the above

2. How many lines are perpendicular to a given plane 2638

a. the null set
b. one line
*c. an infinite number of lines
d. none of the above

3. How many lines can be perpendicular to a given line in the same plane? 2639

a. the null set
b. one
c. two or more
*d. an infinite number
e. none of the above

4. How many planes can be perpendicular to a given line at a given point of that line? 2640

a. the null set
*b. one and only one
c. an infinite number
d. none of the above

THE STUDENT CAN DEMONSTRATE HIS KNOWLEDGE OF PARALLEL AND PERPENDICULAR RELATIONSHIPS BETWEEN LINES AND PLANES BY STATING WHETHER A STATEMENT IS ALWAYS TRUE, SOMETIMES TRUE OR NEVER TRUE. (4) 0695

1. If a plane intersects one of two parallel lines in one point, it intercepts the second in one point also. The above statement is 2641

*a. always true
b. sometimes true
c. never true

2. If a plane intersects one of two parallel lines in two or more points, it intercepts the other in two or more points. The above sentence is 2642

a. always true
*b. sometimes true
c. never true

3. A plane parallel to each of two parallel lines contains neither of them. The sentence is 2643

a. always true
*b. sometimes true
c. never true

4. If a plane intercepts one of two perpendicular lines, it intercepts the other one also. The sentence is 2644

a. always true
*b. sometimes true
c. never true

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS UNDERSTANDING OF THE PARALLEL AND PERPENDICULAR RELATIONSHIP BETWEEN PLANES AND LINES BY CHOOSING THE CORRECT ONE. (8) 0696

1. Two planes perpendicular to the same line at distinct points are 2645

a. always intersecting
*b. always parallel
c. skew
d. sometimes parallel and sometimes intersecting

2. Two planes perpendicular to the same plane are 2646

a. always intersecting
b. always parallel
c. skew
*d. sometimes parallel and sometimes intersecting

3. Two planes each parallel to a third plane are 2647

a. always intersecting
*b. always parallel
c. skew
d. sometimes intersecting and sometimes parallel

4. Two lines each perpendicular to the same plane at distinct points are 2648

a. always intersecting
*b. always parallel
c. skew
d. sometimes intersecting and sometimes parallel

5. If a plane contains line 1 and is intercepted by line q, the two possible relationships between the lines are 2649

*a. intersecting and skew
b. intersecting and parallel
c. skew and parallel

6. Two planes both parallel to the same line are: 2650

a. always parallel
b. always intersecting
c. skew
*d. sometimes intersecting and sometimes parallel

7. If a line is perpendicular to one of two parallel planes it is 2651

a. parallel to the other
b. intersect the other
*c. perpendicular to the other
d. none of the above

8. Two lines parallel to the same plane are 2652

a. intersecting
b. parallel
c. skew
*d. all of the above
e. intersecting and parallel

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF RIGHT TRIANGLES BY COMPUTING SEGMENT LENGTHS AND ANGLE MEASURES IN SPECIAL RIGHT TRIANGEES. (12) 0730

1. $\triangle$ ABC is a right triangle with $\angle$ C a right angle. If m$\angle$ B = 30° and AC = 4, then the length of $\overline{AB}$ is 2931

a. undetermined
*b. 8
c. $4\sqrt{3}$
d. $2\sqrt{3}$

2. $\triangle$ ABC is a right triangle with $\angle$ C a right angle. If AB = 10 and AC = 5, then m$\angle$ A is 2932

a. 45°
b. 30°
*c. 60°
d. undetermined

3. $\triangle$ ABC is an isosceles right triangle with $\angle$ C a right angle. If AB = 10, then BC is 2933

a. 5
b. $5\sqrt{3}$
*c. $5\sqrt{2}$
d. undetermined

4. In $\triangle$ ABC, if AB = $4\sqrt{2}$, AC = BC = 4, then 2934

a. m$\angle$ B = 90°
b. m$\angle$ A = 60°
c. m$\angle$ A = 30°
* d. m$\angle$ B = 45°

5. $\triangle$ABC is a right triangle with $\angle$C a right angle. If m$\angle$A = 60° and BC = 10, then AC is 2935

a. 5
b. $5\sqrt{3}$
*c. $\frac{10}{3}\sqrt{3}$
d. $\frac{5}{3}\sqrt{3}$

6. If one leg of an isosceles right triangle has length 5, then the length of the hypotenuse is 2936

*a. $5\sqrt{2}$
b. 10
c. $5\sqrt{3}$
d. $10\sqrt{2}$

7. $\triangle$ABC is a right triangle with $\angle$C a right angle. If m$\angle$B = 30° and median $\overline{CD}$ is drawn, then m$\angle$ACD is 2937

a. 30°
*b. 60°
c. 45°
d. undetermined

8. $\triangle$ABC is a right triangle with $\angle$C a right angle. If $\overline{AD}$ is an angle bisector m$\angle$B = 30° and AB = 10, then the length of $\overline{AD}$ is 2938

*a. $\frac{10}{3}\sqrt{3}$
b. 5
c. $7\frac{1}{2}$
d. $5\sqrt{3}$

9. $\triangle$ABC is a right triangle with $\angle$ C a right angle. If m$\angle$ A = 45°, and AB = $10\sqrt{2}$, then the length of median AD is 2939

a. 10
b. $5 + 5\sqrt{2}$
c. $5\sqrt{3}$
*d. $5\sqrt{5}$

10. If one leg of an isosceles right triangle has length 6, then the length of the altitude to the hypotenuse is 2940

a. $6\sqrt{2}$
b. $3\sqrt{3}$
*c. $3\sqrt{2}$
d. $2\sqrt{6}$

11. $\triangle$ABC is a right triangle with $\angle$C a right angle. If AB = 12 and AC = 6, then the median $\overline{AD}$ has length 2941

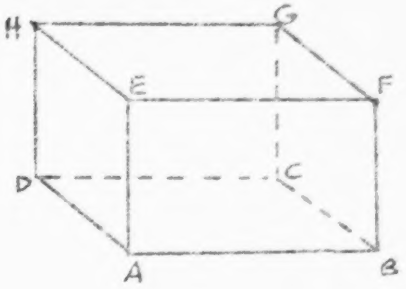
*a. $3\sqrt{7}$
b. 3
c. $6\sqrt{7}$
d. 9

12. $\triangle$ABD and $\triangle$BCD are coplanar equilateral triangles with A $\neq$ C. If AD = 10, then AC is 2942

a. 5
b. $5\sqrt{3}$
c. 10
*d. $10\sqrt{3}$

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF PROPERTIES OF GEOMETRIC SOLIDS, AUXILIARY SETS, PYTHAGOREAN THEOREM AND REGULAR POLYGONS TO COMPUTE LENGTHS OF SEGMENTS. (10) 0735

1.



If all of the six faces of the prism in the figure are rectangles, AB = 12, AD = 16, and AE = 15, then the length of HB is 3017

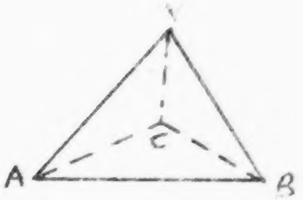
a. 20
*b. 25
c. $\sqrt{337}$
d. $5\sqrt{7}$

2.

If the length of one edge of a cube is 10, then the length of a segment joining two vertices which are not in the same face is 3018

*a. $10\sqrt{3}$
b. $10\sqrt{2}$
c. $10\sqrt{6}$
d. $10\sqrt{5}$

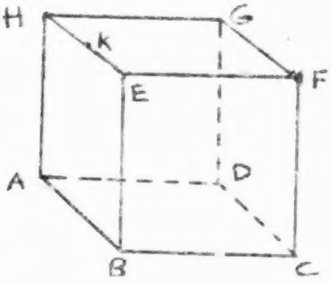
3.



If V - ABC is a regular tetrahedron and VA = AB = 12, then the distance from V to plane ABC is 3019

*a. $4\sqrt{6}$
b. $2\sqrt{22}$
c. $2\sqrt{13}$
d. undetermined

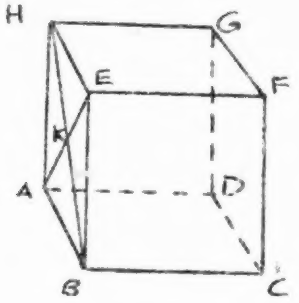
4.



Given a cube as indicated in the figure. If AB = 8 and K is the mid-point of $\overline{HE}$, then the length of $\overline{CK}$ is 3020

- a. $8\sqrt{3}$
- b. $4\sqrt{7}$
- c. $4\sqrt{5}$
- *d. 12

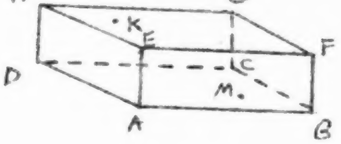
5.



Given a cube as indicated in the figure. If BC = 6, and $\overline{HB} \cap \overline{AE} = K$, then the length of $\overline{CK}$ is 3021

- *a. $3\sqrt{6}$
- b. $3\sqrt{5}$
- c. $\frac{1}{2}(9 + \sqrt{5})$
- d. $6\sqrt{2}$

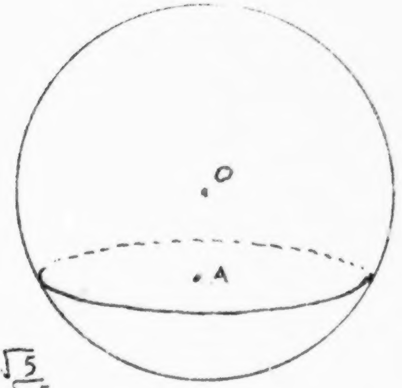
6.



Given a rectangular solid as indicated in the figure. K is in the interior of EFGH and M is in the interior of ABFE. If the distances from K to $\overline{EH}$ and $\overline{HG}$ are respectively 3 and 2, the distances from M to $\overline{AB}$ and $\overline{BF}$ are respectively 3 and 4, and AB = 10, BC = 8, BF = 6, then the shortest distance from K to M on the surface of the solid is 3022

- a. $6 + \sqrt{109}$
- *b. $3\sqrt{10}$
- c. $3\sqrt{7}$
- d. $\sqrt{145}$

7.



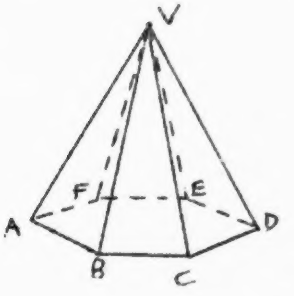
Given sphere O with small circle A as indicated in the figure. If the radius of ⊙ A is 4 and OA = 5, then the radius of sphere O is 3023

a. $2\sqrt{5}$
b. $4\sqrt{5}$
*c. $\sqrt{41}$
d. undetermined

8. If all the edges of a tetrahedron have length 6, then the radius of the sphere which circumscribes the tetrahedron is 3024

a. $3\sqrt{3}$
b. $6\sqrt{3}$
c. $2\sqrt{6}$
*d. $\frac{4}{3}\sqrt{6}$

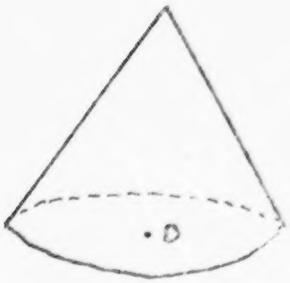
9.



If V - ABCDEF is a regular hexagonal pyramid as indicated in the figure with BC = 6 and VB = 10, then the length of the altitude of the pyramid is 3025

a. 6
*b. 8
c. $2\sqrt{34}$
d. $\sqrt{91}$

10.



Given a right circluar cone as indicated in the figure. If the diameter of the base has length 10 and the slant height of the cone has length 8, then the altitude of the cone has length 3026

a. 6
b. $\sqrt{41}$
*c. $\sqrt{39}$
d. $4\sqrt{5}$

THE STUDENT CAN DEMONSTRATE THE ABILITY TO APPLY LINEAR MEASUREMENT PRINCIPLES TO FIND PARTICULAR SEGMENTS OF CIRCLES. (3) 0741

1. If A, B, and C divide $\odot O$ into three congruent arcs each of length 2π then the length of $\overline{AB}$ is 3090

a. $2\pi - \sqrt{3}$
*b. $3\sqrt{3}$
c. 6
d. $2\sqrt{3}$

2. If two concentric circles have radii of length 10 and 6, then the length of a chord of the larger circle which is tangent to the smaller circle is 3091

a. $\underline{8}$
b. $\sqrt{136}$
*c. 16
d. undetermined

3. In $\odot O$, if chord $\overline{AB}$ has twice the length of chord $\overline{CD}$, then 3092

a. $m\angle AOB = 2m\angle DOC$
b. $m\angle AOB < 2m\angle DOC$
*c. $m\angle AOB > 2m\angle DOC$
d. length $\widehat{AB} = 2$ length $\widehat{CD}$

THE STUDENT WILL BE ABLE TO APPLY KNOWLEDGE OF THE AREA FUNCTION BY CHOOSING CORRECT AREAS OR AREA RATIOS IN GIVEN SITUATIONS. (11) 0255

Instructions: A square and an equilateral triangle have sides of length 8.

What is the ratio of the area of the square region to the area of the triangular region. 0939

*a. $\frac{4}{\sqrt{3}}$

b. $\frac{4}{3}$

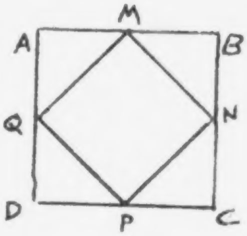
c. $\frac{16}{9}$

d. $\frac{4\sqrt{3}}{1}$

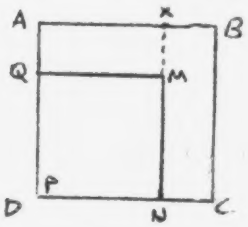
e. $\frac{4}{1}$

By what factor would each side of the triangle have to be increased so that the new triangular region would have twice the area of the old triangular region? 0940

a. 4
b. 3
c. 2
d. $\sqrt{3}$
*e. $\sqrt{2}$



Square MNPQ is formed by joining the midpoints of the sides of square ABCD.



Then MNPQ is turned so that it lies inside ABCD in one corner as illustrated.

If the area of square region MNPQ is 16 what is the area of square region ABCD ? 0941

a. 64
b. 128
c. 24
*d. 32
e. 36

What is the area of the rectangular region AXMQ ? 0942

a. $32 - 16\sqrt{2}$

b. $64 - 32\sqrt{2}$

c. $16\sqrt{2} - 32$

d. $32\sqrt{2} - 16$

*e. $16\sqrt{2} - 16$

Find the length of BM in the second diagram? 0943

*a. $8 - 4\sqrt{2}$

b. $4 - 2\sqrt{2}$

c. $16 - 4\sqrt{2}$

d. $4\sqrt{2} - 16$

e. $8\sqrt{2} - 4$

An equilateral triangle is inscribed within a circle of radius 10. The area of the triangular region is__________ 0944

a. $25\sqrt{3}$

b. $50\sqrt{3}$

*c. $75\sqrt{3}$

d. $100\sqrt{3}$

e. not given

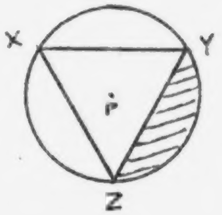
Given:
The circle with center at P and radius 12. Triangle XYZ is an equilateral triangle. The area of the shaded region is_________. 0945

*a. $48\pi - 36\sqrt{3}$

b. $48\pi - 72\sqrt{3}$

c. $36\sqrt{3} - 8\pi$

d. $8\pi - 4\sqrt{3}$



A right triangle is inscribed within a circle of radius 6. The maximum number which could represent the area of this triangular region is__________ 0946

a. 108
b. 72
c. 48
*d. 36
e. 18

Four equilateral triangular regions A_1, A_2, A_3, A_4 have areas in the ratio of 1:2:3:4. The sum of their areas is 270 $\sqrt{3}$ respectively. Find the length of a side of A_3. 0947

a. 9
*b. 18
c. 27
d. 36
e. none of the above

A regular hexagon is inscribed within a circle of radius 12. The area of the circular region not included in the hexagonal region is____________ 0948

a. $144\pi - 36\sqrt{3}$

b. $144\pi - 6\sqrt{3}$

c. $144\pi - 144\sqrt{3}$

*d. $144\pi - 216\sqrt{3}$

e. none of the above

Find the length of the median of the trapezoid. 0949

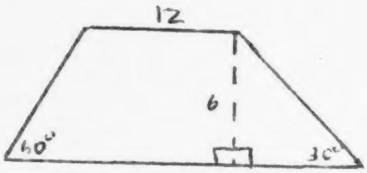
*a. $12 + 4\sqrt{3}$

b. $60 + 30\sqrt{3}$

c. $18 + 9\sqrt{3}$

d. $6 + 4\sqrt{3}$

e. $12 + 8\sqrt{3}$



THE STUDENT DEMONSTRATES HIS ABILITY TO FIND AREAS OF TRIANGLES BY CHOOSING THE CORRECT AREA OF A GIVEN TRIANGLE. (3) 0145

Find the area of the $\triangle ABC$ given $a = 10$, $c = 8$ and $b = 30^\circ$. 0402

*a. 20
b. 40
c. 25
d. 50

Find the area of the triangle $\triangle ABC$ given $a = 7$, $b = 12$, $c = 13$. 0403

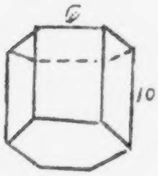
a. 37
b. 46
c. 39
*d. 42

Find the area of the parallelogram if the adjacent sides are 22 in. and 15 in. long and the included angle measures 80°. 0404

a. 275
b. 300

*c. 325
d. 350

THE STUDENT WILL BE ABLE TO APPLY HIS UNDERSTANDING OF SPATIAL RELATIONSHIPS TO COMPUTE THE AREA OF CROSS SECTION, LATERAL SURFACE, AND TOTAL SURFACE, AND THE VOLUMES OF POLYGONAL SOLIDS BY CHOOSING THE CORRECT AREA OR VOLUME MEASURE. (7) 0264



Given the regular hexagonal right prism.

The lateral surface area of the prism is 0998

a. 60
b. 180
*c. 360
d. 720
e. none of the above

The total surface area is 0999

a. $60 + 54\sqrt{3}$

b. $180 + 54\sqrt{3}$

c. $360 + 54\sqrt{3}$

*d. $360 + 108\sqrt{3}$

e. none of the above

The volume of the prism is 1000

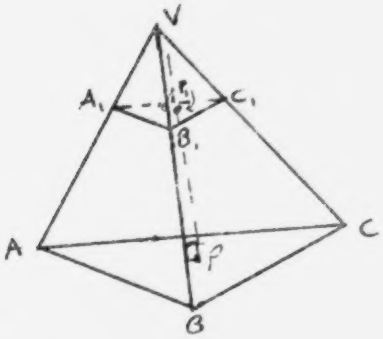
a. $54\sqrt{3}$

b. $108\sqrt{3}$

*c. $540\sqrt{3}$

d. $1080\sqrt{3}$

e. none of the above



Triangle ABC is equilateral
$A_1B_1C_1$ is a cross section of
the pyramid

If AB = 6 and VP = 8, then the volume of the pyramid is 1001

a. $108\sqrt{3}$
b. $72\sqrt{3}$
c. $36\sqrt{3}$
d. $18\sqrt{3}$
*e.. none of the above

If AB = 6 and each face of the pyramid is equilateral, then the total surface area is 1002

*a. $36\sqrt{3}$
b. $27\sqrt{3}$
c. $18\sqrt{3}$
d. $9\sqrt{3}$
e. none of the above

If VP = 9, VP_1 = 2, and area of triangular region ABC = 405, then area of triangular region $A_1B_1C_1$ = 1003

a. 90
b. 75
c. 60
*d. 20
e. none of the above

Find the volume of V-$A_1B_1C_1$ using the information of problem above. 1004

a. 810 cu units
b. 270 cu units
c. 60 cu units
*d. 13 1/3 cu units
e. none of the above

THE STUDENT CAN APPLY HIS KNOWLEDGE OF THE RELATIONSHIPS OF AREAS AND SIDES OF SIMILAR POLYGONS TO COMPUTE RATIOS OF AREAS AND SIDES OF SUCH POLYGONS. (12) 0732

1. If △ ABC ∼ △ DEF and 3 AB = 2 DE, the ratio of the area of △ ABC to the area of △ DEF is 2987

a. 2 : 3
*b. 4 : 9
c. 3:: 2
d. 3 : 5

2. If the perimeter of one square is twice the perimeter of another square, then the ratio of their areas is 2988

*a. 1 : 4
b. 1 : 2
c. 1 : 3
d. not determined

3. The segment joining the midpoints of two sides of a triangle divides the triangle into two regions whose areas have ratio 2989

a. 2 : 3
b. 1 : 2
c. 1 : 4
*d. 1 : 3

4. Chord $\overline{AB}$ and chord $\overline{CD}$ in $\odot O$ intersect at E. If AE = 5 and AB = 8, then the ratio of the area of $\triangle$ ADE to the area of $\triangle$ BCE is 2990

a. 5 : 3
b. 25 : 64
*c. 25 : 9
d. undetermined

5. If the altitude $\overline{CD}$ to the hypotenuse of right $\triangle$ ABC divides the hypotenuse into segments of length 1 and 9, then the ratio of the areas of the two triangles formed by $\overline{CD}$ is 2991

a. 1 : 81
*b. 1 : 9
c. 1 : 3
d. undetermined

6. $\triangle$ ABC is a right triangle with $\angle$ C a right angle. If AC = 3 and BC = 4, then the altitude to the hypotenuse forms two triangles whose areas have ratio 2992

*a. 9 : 16
b. 3 : 4
c. 3 : 5
d. 9 : 25

7. ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 6, CD = 10, $\overline{AC}$ and $\overline{BD}$ intersect at E, then the ratio of the area of $\triangle$ABE to $\triangle$CDE is 2993

*a. 9 : 25
b. 6 : 10
c. 2 : 3
d. undetermined

8. $\triangle$ ABC and $\triangle$ DEF are equilateral triangles. If the length of an altitude of $\triangle$ ABC is equal to the length of a side of $\triangle$ DEF, then the ratio of the area of $\triangle$ ABC to the area of $\triangle$ DEF is 2994

a. 3 : 1
*b. 4 : 3
c. 2 : 1
d. 3 : 2

9. The areas of two similar triangles are 16 and 25. If the shortest side of the smaller triangle has length 8, then the shortest side of the larger triangle has length 2995

a. $12\frac{1}{2}$
b. $19\ \frac{17}{32}$
*c. 10
d. 12

10. ABCD is a parallelogram with AB = 12. E is a point on $\overline{CD}$ and $\overline{AE}$ intersects $\overline{BD}$ at F. If the area of $\triangle$ DEF is one-third the area of $\triangle$ ABF, then DE is 2996

a. 4
b. $4\sqrt{6}$
c. $4\ \frac{1}{3}$
*d. $4\sqrt{3}$

11. A tangent line to $\odot$ O at A intersects a secant line to $\odot$ O at B. If the secant line intersects $\odot$ O at C and D with C between B and D and AB = 6, BD = 9, then the ratio of the area of $\triangle$ ACB to the area of $\triangle$ ADB is 2997

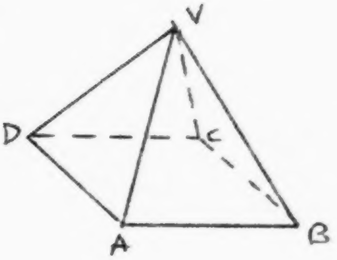
*a. 4 : 9
b. 2 : 3
c. 25 : 36
d. undetermined

12. If the lengths of the edges of a cube are doubled to obtain the lengths of the edges of a second cube, then the ratio of the surface areas of the two cubes is 2998

a. 1 : 2
*b. 1 : 4
c. 1 : 8
d. 1 : $\sqrt{2}$

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF GEOMETRIC SOLIDS, AUXILIARY SETS, PYTHAGOREAN THEOREM AND REGULAR POLYGONS TO COMPUTE SURFACE AREAS OF GEOMETRIC SOLIDS. (12) 0736

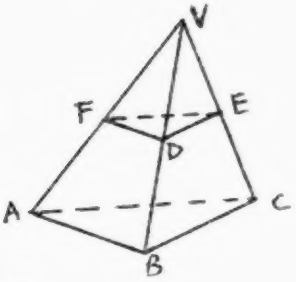
1.



If V - ABCD is a regular pyramid as indicated in the figure, AB = 8, VA = 5, then the lateral area of the pyramid is 3027

a. 112
* b. 48
c. 96
d. 80

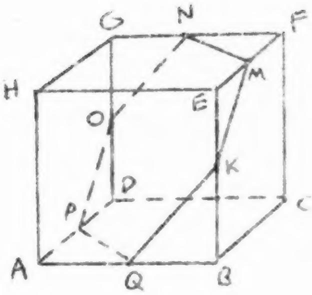
2.



A plane parallel to the base of the pyramid V - ABC determines a section DEF as indicated in the figure. If VE = 2, EC = 3 and area of ABC = 25, then area DEF is 3028

*a. 4
b. $16\frac{2}{3}$
c. 10
d. $8\frac{1}{3}$

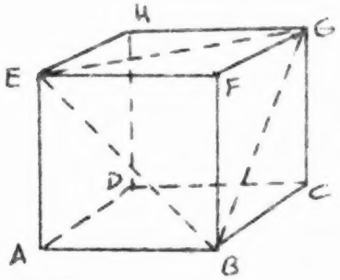
3.



Given a cube as indicated in the figure. If N, M, and K are midpoints of $\overline{GF}$, $\overline{EF}$, and $\overline{BE}$ respectively, plane NMK forms section NMKQPO with the cube and AB = 10, then the area of NMKQPO is 3029

a. $100\sqrt{3}$
b. $150\sqrt{3}$
*c. $75\sqrt{3}$
d. $50\sqrt{3}$

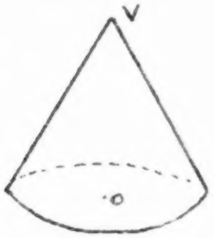
4.



Given a cube as indicated in the figure. If AB = 6, then the area of EBG is 3030

a. $18\sqrt{2}$
b. $9\sqrt{3}$
c. $36\sqrt{3}$
*d. $18\sqrt{3}$

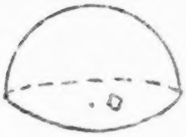
5.



Given a right circular cone as indicated in the figure. If the radius of the base is 5 and the altitude of the cone is 12, then the area of the cone is 3031

a. 30π
*b. 65π
c. 100π
d. $\frac{65}{2}\pi$

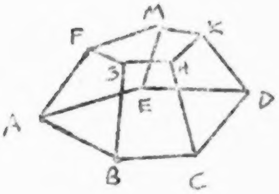
6.



Given a hemisphere as indicated in the figure. If the area of ⊙ O is 36π, then the total surface area of the solid determined by the hemisphere and its base is 3032

*a. 108π
b. 72π
c. 144π
d. 288π

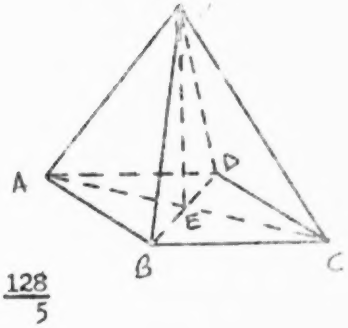
7.



Given a frustum of a regular pyramid as indicated in the figure. If the perimeters of the bases are 50 and 20 and HC = 5, then the lateral area of the frustum is 3033

*a. 175
b. 350
c. 140
d. 200

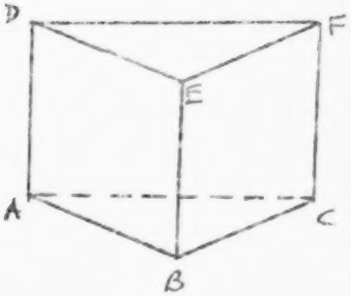
8.



Given pyramid V – ABCD with rhombus ABCD as base. If $\overline{AC}$ and $\overline{BD}$ intersect at E, $\overline{VE}$ pl. ABCD, AC = 8, BD = 6 and $\overline{VE}$ = 3 then the lateral area of the pyramid is 3034

a. $\frac{128}{5}$
b. $\frac{256}{25}$
c. 64
*d. $6\sqrt{41}$

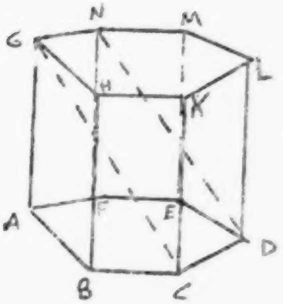
9.



Given a right prism as indicated in the figure. If $\triangle$ ABC is a right triangle with $\angle$ B a right angle, AB = 5, BC = 12, BE = 10, then thetotal area of the prism is 3035

*a. 360
b. 300
c. 600
d. 260

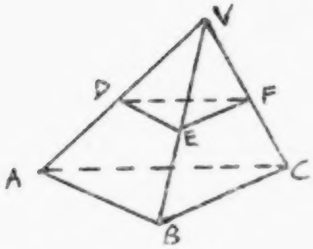
10.



Given a regular hexagonal prism as indicated in the figure. If AB = 6 = HB, then the area of CDNG is 3036A

a. $36\sqrt{3}$
b. $12\sqrt{21}$
*c. 72
d. 108

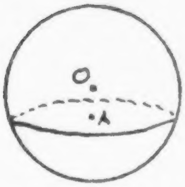
11.



Given $\triangle$ DEF formed by the intersection of pyramid V - ABC and a plane parallel to the base of the pyramid. If area $\triangle$ DEF = $\frac{1}{2}$ area $\triangle$ ABC, then the ratio of VF to FC is 3036B

a. 1 : 1
b. 1 : 1
*c. $(\sqrt{2} + 1) : 1$
d. $\sqrt{2} : 1$

12.



Given sphere O with small circle A as indicated in the figure. If OA is one-half the radius of the sphere, then the ratio of the area of OA to the area of a great circle of the sphere is 3037

a. 1 : 4
*b. 3 : 4
c. 1 : 2
d. $1 : \sqrt{2}$

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF AREA FORMULAS BY COMPUTING AREAS OF REGIONS INVOLVING CIRCLES. (15) 0734

1. If the diameter of ⊙O is 6, then the area of ⊙O in terms of π is 3002

*a. 9π
b. 6π
c. 12π
d. 36π

2. If the circumference of ⊙O is 16π, then the area of ⊙O is 3003

a. 256π
*b. 64π
c. 8π
d. 16π

3. If $\triangle$ ABC is an equilateral triangle with sides of length 12, then the area of the circumscribed circle of $\triangle$ ABC is 3004

a. 36π
b. 144π
*c. 48π
d. 16π

4. ABCD is a rectangle with AB = 6 and BC = 8. If $\odot O$ is circumscribed about ABCD, then the area of $\odot O$ is 3005

a. 36π
b. 48π
c. 16π
*d. 25π

5. If the radius of $\odot O$ has length 5 and sector OAB has a central angle of measure 45°, then the area of sector AOB is 3006

*a. $3\frac{1}{8}\pi$
b. 5π
c. $6\frac{1}{4}\pi$
d. $1\frac{1}{4}\pi$

6. If the radius of $\odot O$ is 4 and the distance from O to chord $\overline{AB}$ in $\odot O$ is 2, then the area of sector OAB is 3007

a. 4π
*b. $\frac{16}{3}\pi$
c. $\frac{8}{3}\pi$
d. $\frac{4}{3}\pi$

7. If the length of the radii of two circles are 3 and 4, then the ratio of their areas is 3008

a. 3 : 4
b. 3 : 7
*c. 9 : 16
d. 3 : 8

8. If the circumferences of two circles are 10π and 12π, then the ratio of their areas is 3009

a. 5 : 6
b. 5 : 12
c. 5 : 11
*d. 25 : 36

9. If two circles are concentric and $\overline{AB}$ is a chord of the larger circle which is tangent to the smaller circle, then the area of the region "between" the two circles is 3010

a. $(AB)^2 \cdot \pi$

*b. $\frac{1}{2}(AB)^2 \cdot \pi$

c. $\left(\frac{AB}{2}\right)^2 \cdot \pi$

d. undetermined

10. If $\odot O$ is inscribed in a square the length of whose diagonals is $6\sqrt{2}$, then the area of $\odot O$ is 3011

*a. 9π
b. 36π
c. $36 \cdot 2\pi$
d. 18π

11. If ABCD is a square, then the ratio of the area of the circle inscribed in ABCD to the area of the circle circumscribed about ABCD is 3012

a. $1 : 2$
*b. $1 : \sqrt{2}$
c. $1 : 3$
d. $1 : \sqrt{4}$

12. If a square is inscribed in a 90° - sector of a circle whose radius has length 6, then the area of the part of the sector which is not in the interior of the square is 3013

a. $9\pi - 12$
b. $18\pi - 12$
*c. $9\pi - 18$
d. $18\pi - 48$

13. If $\triangle ABC$ is an equilateral triangle whose sides have length 9 and circles are drawn in the plane of $\triangle ABC$ with centers A, B, and C and radii of length 9, then the area of the region in the interior of all the circles is 3014

a. $\frac{81}{2} (\pi - \sqrt{3})$

b. $\frac{27}{2} \pi$

c. $\frac{81}{2} (3\pi + \sqrt{3})$

d. $\frac{81}{4} (\pi - 3)$

14. If $\triangle ABC$ is an equilateral triangle whose sides have length 12 and circles are drawn in the plane of $\triangle ABC$ with centers A, B, and C and radii 6, then the area of the region in the interior of the triangle and bounded by arcs of the circles is 3015

a. $9\sqrt{3}$
b. $9(\pi - 3)$
c. $36(\pi - 3)$
* d. $18(2\sqrt{3} - \pi)$

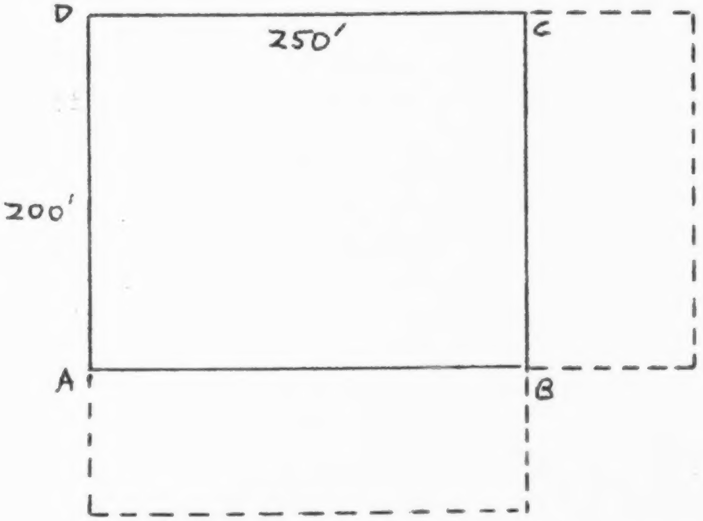
15. In ⊙ O , if $\overline{AB}$ and $\overline{CD}$ are parallel chords on the same side of O, the radius of ⊙O has length 12, AB = 12, CD = $12\sqrt{2}$, then the area of the region of the interior of the circle which is between $\overline{AB}$ and $\overline{CD}$ is 3016

*a. $12\pi + 36\sqrt{3} - 72$

b. undetermined
c. $132\pi + 72 - 36\sqrt{3}$
d. $144\pi - 72$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY HIS KNOWLEDGE OF AREA AND PERIMETER BY COMPARING THE AREA OF TWO GIVEN FLOOR PLANS. (1) 0484

1. 1801



The floor of a warehouse measures 200 ft. by 250 ft. The owners need to increase the floor area by 15%. This means pouring a concrete floor and putting up the walls.

Which would be the better plan ? To build the addition on side CB (dotted line) or on side AB (dotted line).

*a. the better plan is to build the addition on side CB
b. the better plan is to build the addition on side AB
c. both plans will cost the same

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE AREA PROBLEMS BY DECIDING WHAT INFORMATION IS NECESSARY TO SOLVE GIVEN PROBLEMS. (5) 0479

Directions: In the following items, a question is asked and is followed by two statements labeled (1) and (2). Decide whether the data given in statements (1) and/or (2) is enough to answer the question and mark each item:

a. if date given in statement (1) alone is sufficient but statement (2) alone is not sufficient to answer question asked.
b. if data given in statement (2) alone is sufficient but statement (1) alone is not sufficient to answer question asked.
c. if both statements (1) and (2) together are sufficient to answer the question asked but neither statement alone is sufficient.
d. if each statement alone is sufficient to answer the question asked.
e. if statements (1) and (2) together are not sufficient to answer the question asked and additional information specific to the problem are needed.

c 1. What is the length of a rectangle? 1786
(1) the area of the rectangle is 100.
(2) the width of the rectangle is 20.

d 2. What is the perimeter of a square? 1787
(1) the area of the square is 49.
(2) the length of one side of the square is 7.

e 3. What is the height of a triangle? 1788
(1) the length of a side of the triangle is 6.
(2) the triangle is a right triangle.

d 4. What is the length of a leg of an isosceles right triangle? 1789
(1) the length of the hypotenuse of the triangle is 10.
(2) the measure of the altitude to the hypotenuse is 5.

b 5. What is the length of one side of a rhombus? 1790
(1) the length of one of the diagonals is 16.
(2) the perimeter of the rhombus is 40.

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF GEOMETRIC SOLIDS, THE PYTHAGOREAN THEOREM, AUXILIARY SETS AND REGULAR POLYGONS TO COMPUTE VOLUMES OF GEOMETRIC SOLIDS. (17) 0737

1. If the length of one edge of a cube is 5, then the volume of the cube is 3038

a. 25
b. 150
*c. 125
d. 100

2. If the length of all edges of a regular tetrahedron are 6, then the volume of the tetrahedron is 3039

a. $9\sqrt{3}$
b. $36\sqrt{3}$
c. 72
*d. $18\sqrt{2}$

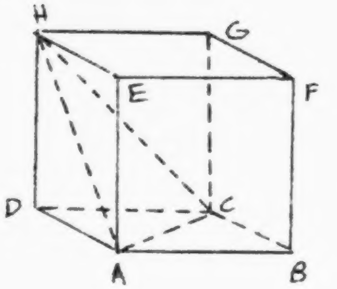
3. If the total surface area of a regular tetrahedron whose faces are equilateral triangles is $324\sqrt{3}$, then the volume of the tetrahedron is 3040

a. 324
b. $324\sqrt{2}$
*c. $486\sqrt{2}$
d. $512\sqrt{2}$

4. If the total surface area of a regular tetrahedron whose faces are equilateral triangles is numerically equal to the volume of the tetrahedron, then the length of one edge of the tetrahedron is 3041

*a. $6\sqrt{6}$
b. $6\sqrt{2}$
c. $3\sqrt{3}$
d. $9\sqrt{3}$

5.

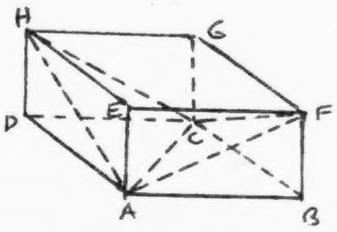


Given a cube as indicated in the figure. If AB = 10, then the volume of pyramid D - HAC is 3042

a. $50\sqrt{2}$
b. $100\sqrt{2}$
* c. $\frac{500}{3}$

d. $\frac{500}{3}\sqrt{2}$

6.



Given a rectangular solid as indicated in the figure. If AB = 3, AD = 4, AE = 2, then the volume of the solid with faces EFGH, HAC, FCA, HEA, HGC, GCF and FEA is 3043

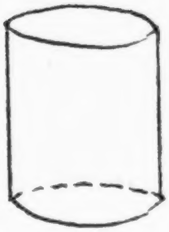
a. 8
*b. 16
c. $8\sqrt{13}$
d. $4\sqrt{13}$

7. If a plane parallel to the base of a pyramid bisects the altitude of the pyramid, the ratio of the volumes of the two solids formed is 3044

*a. 1 : 8
b. 1 : 7
c. 1 : 4
d. 1 : 2

8\.

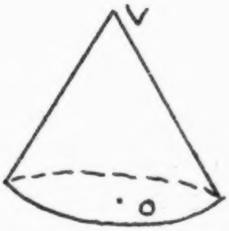
Given a right circular cylinder as indicated in the figure. If the diameter of the base is 10 and the height is 6, then the volume of the cylinder is 3045



- *a. 150π
- b. 60π
- c. 600π
- d. 30π

9\.

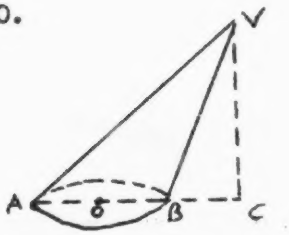
Given a right circular cone as indicated in the figure. If the diameter of the base is 8 and the slant height is 5, then the volume of the cone is 3046



- *a. 16π
- b. 40π
- c. 20π
- d. 10π

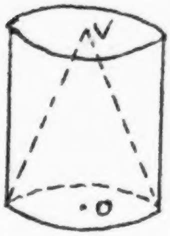
10\.

Given a circular cone as indicated in the figure. If the diameter $\overline{AB}$ of the base has length 8, plane VAB ⊥ plane ⊙O, $\overline{VC} \perp \overleftrightarrow{AB}$, $m\angle VAC = 30^\circ$, $\overline{VA} = 12$, then the volume of the cone is 3047



- a. $16\pi\sqrt{3}$
- b. 16π
- *c. 32π
- d. $32\pi\sqrt{3}$

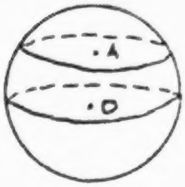
11.



Given a circular cone and a circular cylinder that have the same base and equal altitudes as indicated in the figure. If the radius of the base is 6 and the altitude is 10, then the volume of the part of the cylinder which is not contained in the cone is 3048

a. 300π
b. 180π
c. 120π
*d. 240π

12.



Given sphere O with great circle O and small circle A as indicated in the figure. If plane $\odot A$ is parallel to plane $\odot O$, $OA = 5$ and the radius of the small circle is 6, then the volume of the sphere is 3049

a. $\frac{448}{3}\pi\sqrt{14}$

b. 224π

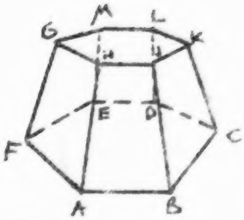
c. $\frac{56}{3}\pi\sqrt{14}$

*d. $\frac{244}{3}\pi\sqrt{61}$

13. If the radius of a sphere is 3, then the volume of the sphere is

a. 27π
*b. 36π
c. 48π
d. 18π

14. Given a frustum of a regular hexagonal pyramid as indicated in the figure. If AB = 6, HJ = 4, AH = 8, then the volume of the frustum is 3051

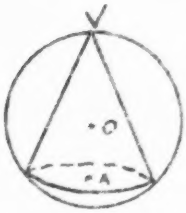


a. $156\sqrt{5}$
b. $304\sqrt{3}$
c. $225\sqrt{5}$
*d. $228\sqrt{5}$

15. If the lengths of all the edges of a rectangular solid are multiplied by three, then the ratio of the volume of the new solid to the volume of the original solid is 3052

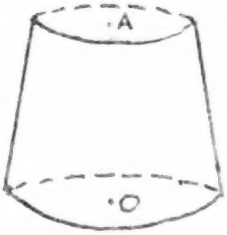
a. 3 : 1
b. 9 : 1
*c. 27 : 1
d. $3\sqrt{3} : 1$

16. Given sphere O with small circle A as indicated in the figure. If the radius of the small circle is 4, the radius of the sphere is 5, and a right circular cone is drawn with base ⊙ A and vertex V on the sphere, then the volume of that part of the sphere which is not in the cone is 3053



*a. 124π
b. 120π
c. 240π
d. 148π

17.



Given a frustum of a right circular cone with bases ⊙O and ⊙A as indicated in the figure, If the radii of the bases are 4 and 5 and OA = 6, then the volume of the frustum is 3054

a. 128π
b. 250π
*c. 122π
d. 120π

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF RADIANS TO DETERMINE THE COORDINATES OF A POINT WHEN GIVEN ONE POINT AND THEN THE ADDITION OF A RADIAN MEASURE. (3) 0296

If $W(s) = (x,y)$, then $W\left(s + \frac{\pi}{2}\right) =$ ____________. 1379

a. $(-x, y)$
b. $(-x, -y)$
c. (y, x)
*d. $(-y, x)$

Which of the following expressions best represents $-\cos S$? 1380

*a. $\sin\left(S - \frac{\pi}{2}\right)$

b. $\cos\left(S - \frac{\pi}{2}\right)$

c. $\sin\left(S + \frac{\pi}{2}\right)$

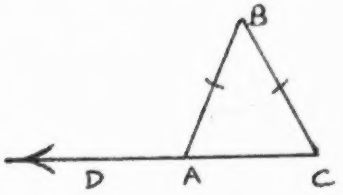
d. $\cos\left(S + \frac{\pi}{2}\right)$

Which of the following expressions best represents $-\sin S$? 1381

a. $\sin(S+\pi)$
b. $\sin(S-\pi)$
*c. $\sin(S\pm\pi)$
d. $\sin(\pi-S)$

THE STUDENT WILL SHOW HIS ABILITY TO APPLY THE THEOREMS RELATING TO THE MEASURE OF THE ANGLES OF A TRIANGLE BY FINDING MEASURES OF GIVEN ANGLES. (5) 0586

1. Given the figure as marked. Which of the following cannot be proved? 2095



a. $\angle DAB > \angle ABC$
b. $\angle DAB > \angle BAC$
*c. $1/2\ m\angle DAB = m\angle ACB$
d. $m\angle DAB = m\angle B + m\angle C$
e. none

2. In $\triangle ABC$, $m\angle B = 70^\circ$, and $d(A,B) = d(C,B)$, then the $m\angle C =$ _____. 2096

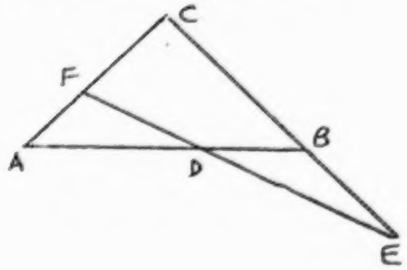
*a. 55°
b. 20°
c. 70°
d. 110°

3. The measure of one angle of a triangle is 26° more than that of the second angle and the measure of the third angle is one-third that of the second. The measure of the first is_______. 2097

a. 66°
*b. 92°
c. 22°
d. 88 2/7 °
e. none of the above

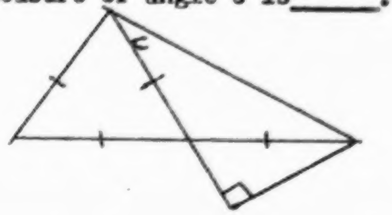
4. In isosceles △ABC, D is a point on base AB. CB is extended so that d(BE) = d(BD). the ratio of m(∠CBD) to m(∠CFD) is_________. 2098

a. 3 to 2
b. 1 to 2
*c. 2 to 3
d. none of the above



5. Given the figure as marked. The measure of angle C is_____. 2099

a. 60°
*b. 30°
c. 15°
d. 45°
e. none of the above



THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF THE RELATIONSHIPS BETWEEN SPECIAL SEGMENTS IN TRIANGLES TO FORM CONCLUSIONS ABOUT ANGLE MEASURE AND SEGMENT MEASURE IN THE TRIANGLE. (16) 0725

1. If the perpendicular bisector of $\overline{AB}$ contains C and C $\notin$ $\overline{AB}$, then $\triangle$ABC is 2872

a. a right triangle
*b. an isosceles triangle
c. an equilateral triangle
d. a scalene triangle

2. If the altitudes and medians of $\triangle$ABC are concurrent, then $\triangle$ABC is 2873

a. an obtuse triangle
*b. an equilateral triangle
c. a scalene triangle
d. a right triangle

3. If the medians $\overline{AD}$ and $\overline{BE}$ of $\triangle$ABC are congruent and intersect at F, then which of the following is not necessarily true? 2874

*a. $\triangle$ABC is equilateral
b. BF = 2FE
c. EF = $\frac{1}{2}$ AF
d. $\triangle$ABC is isosceles

4. $\overline{AE}$ is an angle bisector of $\triangle$ABC and $\overline{AD}$ is a median. Which of the following is sufficient to prove $\triangle$ABC is equilateral? 2875

a. D and E are the same point
b. $\overline{AD} \perp \overline{BC}$
*c. $\overline{AE} \perp \overline{BC}$ and m $\angle$BAE = 30 (degrees)
d. $\overline{AE} = \overline{AD}$

5. $\overline{AD}$ and $\overline{BE}$ are medians of $\triangle ABC$. If $\overline{AD} \cap \overline{BE} = F$ and FD = FE, then 2876

a. $\triangle ABC$ is equilateral
b. $\overline{AD} \perp \overline{BC}$
c. CF = BF
*d. $m\angle CAD = m\angle CBE$

6. If the altitudes of $\triangle ABC$ intersect in a point in the exterior of $\triangle ABC$, then $\triangle ABC$ is 2877

a. an acute triangle
*b. an obtuse triangle
c. a right triangle
d. an isosceles triangle

7. If $\triangle ABC$ is a right triangle, its altitudes intersect at a point which is 2878

a. in the interior of the triangle
b. on the hypotenuse of the triangle
c. in the experior of the triangle
*d. a vertex of the triangle

8. If $\overline{AD}$, $\overline{AE}$, $\overline{AF}$ are an altitude, angle bisector, and median respectively of $\triangle ABC$, then 2879

*a. $AD \leq AE \leq AF$
b. $AE \leq AD \leq AF$
c. $AF \leq AD \leq AE$
d. $AF \leq AE \leq AD$

9. $\triangle ABC$ is a right triangle with a right angle at C. If the hypotenuse of the triangle has length 18 and Q is the point of intersection of the medians, then $\overline{QC}$ has length 2880

a. 9
*b. 6
c. undetermined
d. $\sqrt{18}$

10. If $\overline{AD}$, $\overline{BE}$, and $\overline{CF}$ are medians of $\triangle ABC$, then 2881

a. $\triangle DEF \sim \triangle BAC$
*b. $\triangle DEF \sim \triangle ABC$
c. $\triangle DEF \sim \triangle CAB$
d. $\triangle DEF \sim \triangle CBA$

11. If $\triangle ABC$ is isosceles with $AC = BC$, $AC \neq AB$ and E, F, and G are respectively the points of intersection of the angle bisectors, the medians and the altitudes of $\triangle ABC$, then 2882

a. E, F, and G are the same point
b. F is between E and G
*c. E is between F and G
d. E, F, and G are non-collinear

12. The perpendicular bisectors of the sides of a right triangle intersect at point Q which is in the plane of the triangle. Q is 2883

a. in the interior of the triangle
*b. the mid-point of the hypotenuse
c. in the exterior of the triangle
d. the vertex of the right angle of the triangle

13. If the perpendicular bisectors of two sides of a triangle each contains a vertex of the triangle, then the triangle is 2884

*a. an equilateral triangle
b. an obtuse triangle
c. a right triangle
d. a scalene triangle

14. If the perpendicular bisector of one side of a triangle contains the midpoint of another side of the triangle, then the triangle is 2885

*a. a right triangle
b. an acute triangle
c. an equilateral triangle
d. a scalene triangle

15. If a median of a triangle is half as long as the side to which it is drawn, then the triangle is 2886

a. an acute triangle
b. an obtuse triangle
*c. a right triangle
d. an isosceles triangle

16. If $\overline{AD}$ and $\overline{BE}$ are angle bisectors in $\triangle ABC$, $AD \cap \overline{BE} = F$, and $AD = BE$, then which of the following is not necessarily true? 2887

a. $AC = BC$
b. $\angle CAB \cong \angle CBA$
c. $\overline{DE} \parallel \overline{AB}$
*d. $AF = 2\ FD$

THE STUDENT CAN DEMONSTRATE AN UNDERSTANDING OF RELATIONSHIPS BETWEEN ANGLE MEASURE AND INTERCEPTED ARCS IN A CIRCLE, BY INDICATING THE CORRECT CONSEQUENT FOR A GIVEN ANTECEDENT. (7) 0713

1. If $\overline{AB}$ is a diameter of a circle and C is a point of the circle distinct from A and B, then $\angle ACB$ is 2766

a. an obtuse angle
b. an acute angle
*c. a right angle
d. complementary to $\angle ABC$

2. If $\overleftrightarrow{AB}$ and $\overleftrightarrow{AC}$ are tangent to $\odot O$ at B and C respectively, then 2767

a. $\angle BAC$ is acute
b. $\angle BOC$ is acute
c. $AB > BC$
*d. $m\angle BAC + m\widehat{BC} = 180$

3. If $\overline{AB}$ and $\overline{CD}$ are chords of $\odot O$ and $\overline{AB}$ bisects $\overline{CD}$ at E, then 2768

a. $m\angle AED = m\widehat{AD}$
b. $m\angle AED = \frac{1}{2} m\widehat{AD}$
*c. $m\angle AED = \frac{1}{2}(m\widehat{AD} + m\widehat{BC})$
d. $m\angle AED = \frac{1}{2}(m\widehat{AD} + m\widehat{DC})$

4. If $\angle Q$ is inscribed in an arc whose measure in degrees is 100, then $m\angle Q$ is 2769

a. 100
b. 130
*c. 50
d. 80

5. If quadrilateral ABCD is inscribed in $\odot O$, then 2770

a. AC is a diameter
b. $\angle C$ is a right angle
c. $\angle A \cong C$
*d. $\angle A$ and $\angle C$ are supplementary

6. If $\overleftrightarrow{AB}$ is tangent to $\odot O$ at C, $\overline{CD}$ is a chord of the circle and E is a point of the circle which is in the interior of $\angle DCB$, then 2771

a. $m\angle DCB = m\,\overparen{DEC}$
b. $\angle DCB$ is an inscribed angle
c. $m\angle DCB = 180 - \frac{1}{2}\,m\,\overparen{DEC}$
*d. $m\angle DCB = 180 - m\,\overparen{DEC}$

7. If $\overleftrightarrow{AB} \cap \odot O =$ point Q, and AB is in the plane of $\odot O$, then 2772

a. $\overline{AB}$ is a chord of the circle
b. $\overleftrightarrow{AB}$ is a secant of the circle
*c. $\overleftrightarrow{AB}$ is tangent to the circle
d. Q is in the interior of $\odot O$

THE STUDENT WILL BE ABLE TO APPLY HIS UNDERSTANDING OF ADDING MEASURES OF SEGMENTS AND ANGLES BY FINDING THE SUM OF SEGMENTS OR ANGLES. (3) 0580

1. If R is in the interior of $\angle ABS$ and S is in the interior of $\angle RBC$, and $\angle ABR \cong \angle CBS$, then _______. 2076

a. $\angle RBS \cong \angle CBS$
b. $\angle CBR \cong \angle RBA$
c. $\angle ABS \cong \angle CBS$
*d. $\angle ABS \cong \angle CBR$

2. If R is in the interior of $\angle ABS$ and S is in the interior of $\angle RBC$ and $\angle ABS \cong \angle RBC$, then_______. 2077

*a. $\angle ABR \cong \angle CBS$
b. $\angle ABS \cong \angle CBS$
c. $\angle ABR \cong \angle CBR$
d. $\angle RBS \cong \angle CBS$

3. If A-B-C and R-S-T, $\overline{AB} \cong \overline{RS}$, and $\overline{BC} \cong \overline{ST}$, then_____. 2078

*a. $\overline{AC} \cong \overline{RT}$
b. $\overline{AB} \cong \overline{ST}$
c. $\overline{RS} \cong \overline{BC}$
d. $B = S$

POLYGONS

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO CLASSIFY QUADRILATERALS ACCORDING TO THEIR CHARACTERISTICS BY CHOOSING THE CORRECT NAME FROM A DESCRIPTION. (10) 0202

Every quadrilateral with all four sides congruent is 0741

a. a square
*b. a rhombus
c. a rectangle
d. a trapezoid
e. none of the above

Every quadrilateral with two sides parallel is 0742

a. a square
b. a rhombus
c. a rectangle
*d. a trapezoid
e. none of the above

Every quadrilateral whose diagonals are perpendicular is 0743

a. a square
b. a rhombus
c. a rectangle
d. a trapezoid
*e. none of the above

Every quadrilateral whose diagonals bisect each other is 0744

a. a square
b. a rhombus
c. a rectangle
*d. a parallelogram
e. none of the above

Every quadrilateral that is equiangular is 0745

a. a square
b. a rhombus
*c. a rectangle
d. a trapezoid
e. none of the above

Every quadrilateral whose diagonals bisect opposite angles is 0746

a. a square
*b. a rhombus
c. a rectangle
d. a trapezoid
e. none of the above

Every quadrilateral whose diagonals are congruent is 0747

a. a square
b. a rhombus
c. a rectangle
d. a trapezoid
*e. none of the above

Every quadrilateral whose diagonals are congruent and perpendicular is 0748

a. a square
b. a rhombus
c. a rectangle
d. a trapezoid
*e. none of the above

Every quadrilateral whose diagonals are congruent and bisect each other is 0749

a. a square
b. a rhombus
*c. a rectangle
d. a trapezoid
e. none of above

Every quadrilateral whose opposite sides are congruent is 0750

a. a square
b. a rhombus
c. a rectangle
d. a trapezoid
*e. none of the above

THE STUDENT CAN SHOW HIS KNOWLEDGE OF MEDIAN OF A TRIANGLE BY RECALLING THE DEFINITION OF MEDIAN OF A TRIANGLE. (3) 0578

1. A median of a triangle is a(n)________. 2070

a. line
b. ray
c. half line
*d. segment

2. A median of a triangle that contains the vertex of one of the angles_________. 2071

a. bisects the angle from which it is drawn
b. is perpendicular to the opposite side
c. is the perpendicular bisector of the opposite side
*d. is the bisector of the opposite side.

3. A triangle has how many medians? 2072

a. 1
b. 2
*c. 3
d. infinitely many

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO RECALL THE DEFINITION OF TYPES OF TRIANGLES BY SELECTING THE TYPE GIVEN A DESCRIPTION OF A TRIANGLE. (2) 0662

1. If a triangle has two congruent angles, then it is 2545

a. a scalene triangle
*b. an isosceles triangle
c. an equiangular triangle
d. an equilateral triangle

2. If a triangle has angles whose measures are 89°, 61°, 30°, then it is 2546

*a. a scalene triangle
b. an isosceles triangle
c. an equilateral triangle
d. an equiangular triangle

THE STUDENT WILL BE ABLE TO RECALL THE DEFINITIONS OF MEDIANS AND TYPES OF TRIANGLES BY SELECTING THE APPROPRIATE TERM IN COMPLETING A STATEMENT. (2) 0667

1. If any two medians of a triangle are congruent, the triangle is 2560

a. a scalene triangle
b. an isosceles triangle
*c. an equilateral triangle
d. a right triangle

2. If one median of a triangle is perpendicular to the opposite side, the triangle is 2561

a. scalene
*b. isosceles
c. equiangle
d. not enough information given to know

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO RECALL THE NAMES OF THE SIDES OF A RIGHT TRIANGLE BY SELECTING THE WORD THAT MATCHES THE PHRASE DESCRIBING THE SIDE. (1) 0676

1. The side opposite the right angle in a right triangle is called the 2587

a. hypothesis
b. leg
*c. hypotenuse

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF THE DEFINITIONS OF QUADRILATERALS BY DETERMINING WHETHER GENERAL STATEMENTS ARE EITHER ALWAYS TRUE, SOMETIMES TRUE, OR ALWAYS FALSE. (2) 0680

1. The statement "a quaderilateral is the union of 4 line segments" is 2595

a. Always true
*b. Sometimes true
c. Always false

2. The statement "a quadrilateral is a coplanar four sided figure." is 2596

a. Always true
*b. Sometimes true
c. Always false

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF QUADRILATERALS BY CLASSIFYING THEM AS PARALLELOGRAMS, AS RHOMBI, RECTANGLES OR SQUARE, WHEN GIVEN QUADRILATERALS WITH CERTAIN PROPERTIES. (3) 0685

1. If the diagonals of a quadrilateral are congruent, and bisect each other the quadrilateral must be 2610

a. a parallelogram only
b. a rhombus and a parallelogram only
*c. a rectangle and a parallelogram only
d. A square a rhombus, a rectangle and a parallelogram
e. none of the above

2. If the diagonals of a quadrilateral are perpendicular and bisect each other the quadrilateral must be 2611

a. a parallelogram only
*b. a rhombus and a parallelogram only
c. rectangle and a parallelogram only
d. a square, a rhombus, a rectangle and a parallelogram
e. none of the above

3. If the diagonals of a quadrilateral are congruent and perpendicular, the quadrilateral must be: 2612

a. A parallelogram only
b. A rhombus and parallelogram only
c. A rectangle and parallelogram only
d. A square, rhombus, rectangle and parallelogram
*e. None of the above

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY THE CHARACTERISTICS OF DIFFERENT KINDS OF QUADRILATERALS BY SELECTING THE QUADRILATERAL OR PROPERTY OF QUADRILATERALS THAT SATISFIES THE GIVEN CONDITIONS. (7) 0587

1. If the diagonals of a quadrilateral bisect each other, the quadrilateral is a 2100

a. rhombus
b. square
*c. parallelogram
d. rectangle

2. The bisectors of the opposite angles of a nonrhombic parallelogram are 2101

*a. parallel
b. collinear
c. perpendicular
d. skew

3. The figure formed by joining consecutive midpoints of the sides of any quadrilateral is a 2102

*a. parallelogram
b. rectangle
c. rhombus
d. trapezoid

4. The opposite angles of a parallelogram are 2103

a. supplementary
*b. congruent
c. always acute
d. complementary

5. If two opposite sides of a quadrilateral are parallel and the other two sides are congruent, the quadrilateral is a 2104

a. parallelogram
b. rectangle
c. rhombus
*d. trapezoid

6. In a rhombus, the diagonals 2105

a. are congruent
b. bisect each other
c. bisect each other and are congruent
*d. bisect each other and are perpendicular

7. If in quadrilateral ABCD, $\angle A = \angle B$, then the necessary conclusion is 2106

a. $\overline{DC} \parallel \overline{AB}$

b. AD = BC

c. quadrilateral ABCD is an isosceles trapezoid

d. $\overline{BA} \nparallel \overline{CD}$

*e. none of the above

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF QUADRILATERALS BY DETERMINING WHETHER OR NOT THE PROPERTIES OF TWO GIVEN QUADRILATERALS ARE THE SAME. (5) 0593

1. A trapezoid is a parallelogram 2128

*a. never
b. sometimes
c. always

2. Consecutive sides of a rectangle are congruent 2129

a. never
*b. sometimes
c. always

3. A rectangle is a square 2130

a. never
*b. sometimes
c. always

4. A rhombus is a trapezoid 2131

*a. never
b. sometimes
c. always

5. A segment whose end points are vertices of a parallelogram is a diagonal 2132

a. never
*b. sometimes
c. always

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF QUADRILATERAL NOTATION BY CHOOSING CONSECUTIVE SIDES, DIAGONALS, AND CONSECUTIVE ANGLES. (3) 0681

1. In quadrilateral ABCD, two consecutive sides are: 2597

a. $\overline{AB}$ and $\overline{CD}$
b. $\overline{AB}$ and $\overline{AC}$
*c. $\overline{CD}$ and $\overline{DA}$
d. $\overline{BC}$ and $\overline{AD}$
e. $\overline{BD}$ and $\overline{AC}$

2. In quadrilateral RAXB, two consecutive vertices are 2598

a. A and B
*b. B and R
c. R and X
d. None of the above

3. In quadrilateral ADBX, the two diagonals are 2599

*a. $\overline{AB}$ and $\overline{DX}$
b. $\overline{AD}$ and $\overline{BX}$
c. $\overline{AX}$ and $\overline{DB}$
d. $\overline{AD}$ and $\overline{DB}$
e. $\overline{BX}$ and $\overline{AB}$

THE STUDENT CAN USE GENERALIZATIONS ABOUT SPECIAL QUADRILATERALS TO SELECT CONCLUSIONS IN SPECIFIC SITUATIONS. (32) 0708

1. If ABCD is a parallelogram then 2717

a. A, B, and C are collinear
b. AB = BC
*c. BC = DA
d. $\angle A \cong \angle B$

2. If the diagonals of a quadrilateral bisect each other, the quadrilateral is 2718

a. a square
b. a trapezoid
*c. a parallelogram
d. a rhombus

3. If ABCD is a parallelogram, which of the following is not necessarily true? 2719

*a. $AC = BD$
b. $\overline{AB} \perp \overline{CD}$
c. $\angle A \cong \angle C$
d. $\angle A$ and $\angle B$ are supplementary

4. If ABCD is a rhombus then it is not necessarily true that 2720

a. $AB \parallel CD$
b. $\overline{AC} \perp \overline{BD}$
*c. $AC = BD$
d. $\overline{BD}$ bisects $\angle ADC$

5. If ABCD is a quadrilateral with AB = BC and AC and BD bisect each other, then ABCD, as an element of the smallest set to which it belongs, is 2721

a. a trapezoid
b. a square
*c. a rhombus
d. a parallelogram

6. If ABCD is a quadrilateral in which AB = CD, BC = AD and AC bisects $\angle$ DAB, then 2722

a. $AC = BD$
*b. $\overline{AC} \perp \overline{BD}$
c. $\angle$ BAD is a right angle
d. ABCD is a trapezoid

7. If ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$ and $\angle A \cong \angle B$, then 2723

a. $\overline{BC} \parallel \overline{AD}$

*b. AC = BD

c. AC and BD bisect each other

d. AB = CD

8. In order that a rhombus be a square it is sufficient to know that 2724

a. two consecutive angles are supplementary
b. the diagonals are perpendicular
*c. the opposite angles are supplementary
d. the sum of the measures of the angles is 360

9. If the diagonals of a trapezoid are congruent, then 2725

a. the diagonals bisect each other
b. the diagonals are perpendicular
*c. the trapezoid is isosceles
d. the diagonals bisect the angles of the trapezoid.

10. If $\overline{AB} \perp \overline{CD}$ and $\overline{AB}$ bisects $\overline{CD}$ at E then ACBD in its smallest classification is a 2726

a. rhombus
b. square
c. parallelogram
*d. quadrilateral

11. In quadrilateral ABCD, if AB = DC and AD = BC, then 2727

a. $\triangle ABC$ is isosceles
*b. $\overline{AC}$ and $\overline{BD}$ bisect each other
c. $\triangle ABE$ is a right triangle
d. AC bisects $\angle DAB$

12. In quadrilateral ABCD, if $\overline{AB} \parallel \overline{DC}$, AB = DC, and $\overline{AC} \perp \overline{BD}$, then 2728

a. BE = EC
*b. AB = BC
c. AC = BD
d. $\angle DAB$ is a right angle

13. The diagonals of a parallelogram are always 2729

a. perpendicular to each other
b. equal to each other
c. bisectors of the angles through which they pass
*d. bisectors of each other

14. If ABCD is a rhombus then ABCD is necessarily 2730

a. a square
b. a rectangle
*c. a parallelogram
d. a regular polygon

15. If ABCD is an isosceles trapezoid with $\overline{AB} \parallel \overline{CD}$ and CD < AB, then 2731

a. AD > CD
*b. AC > BC
c. BD < AB
d. $\overline{AC}$ bisects $\angle DAB$

16. If $\triangle ABC$ and $\triangle ABD$ are distinct coplanar equilateral triangles, then ACBD is a 2732

a. square
b. rectangle
*c. rhombus
d. trapezoid

17. If ABCD and ABEF are distinct parallelograms, then which of the following is not necessarily true? 2733

a. CD = EF

b. $\angle CBE \cong \angle DAF$

c. $\overline{CD} \parallel \overline{EF}$

*d. AC = AE

18. If a diagonal of a quadrilateral divides it into two equilateral triangles, then which of the following is False? 2734

a. the diagonals of the quadrilateral bisect each other
*b. the diagonals of the quadrilateral are congruent
c. the diagonals of the quadrilateral are perpendicular
d. at least one angle of the quadrilateral has measure 120 (in degrees)

19. If $\overline{AC}$ is the perpendicular bisector of $\overline{BD}$ then 2735

a. ABCD is a rhombus
b. $\underline{AC} = BD$
*c. $\overline{AC}$ bisects $\angle DCB$
d. $\overline{DB}$ bisects $\angle CBA$

20. Which of the following conditions is sufficient to prove that quadrilateral ABCD is a rhombus? 2736

- a. $\overline{AB} \parallel \overline{CD}$ and $AB = CD$
- *b. the opposite angles are congruent and the diagonals are perpendicular
- c. the diagonals are congruent and perpendicular
- d. the diagonals are congruent and bisect each other

21. If $\triangle ABC$ is a right triangle with right angle at C and median $\overline{CD}$ is drawn, then 2737

- a. $\overline{CD}$ bisects $\angle BCA$
- *b. $\angle DCA \cong \angle DAC$
- c. $\overline{CD} \perp \overline{AB}$
- d. $\triangle CBD$ is equilateral

22. In quadrilateral ABCD, if $\overline{BC} \perp \overline{CD}$ and $\overline{AD} \perp \overline{CD}$, then ABCD is necessarily 2738

- a. a square
- b. a rectangle
- *c. a trapezoid
- d. a parallelogram

23. ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. E and F are midpoints of $\overline{AD}$ and $\overline{BC}$ respectively. If $AB = 10$ and $CD = 4$, then the length of EF is 2739

- *a. 7
- b. 14
- c. 6
- d. 28

24. If the opposite angles of a parallelogram are supplementary, then the parallelogram is 2740

a. a square
*b. a rectangle
c. rhombus
d. an equilateral parallelogram

25. In parallelogram ABCD, if ∠ A is acute then 2741

a. ∠B is acute
b. ∠C is obtuse
c. BC < AB
*d. ∠D is obtuse

26. In parallelogram ABCD, if m∠A = 25 (degrees), then the measures of the other angles of ABCD are 2742

a. undetermined
b. 165°, 25°, 165°
*c. 25°, 155°, 155°
d. 65°, 25°, 65°

27. The diagonals of rhombus ABCD intersect at E. If m(∠ DAB) = 60 (degrees), then 2743

a. AC = DB
*b. DB = AB
c. AE = EB
d. DE = EC

28. ABCD is a parallelogram and E is the point of intersection of the diagonals. If F and G are the midpoints of $\overline{AB}$ and $\overline{CD}$ respectively, then 2744

*a. E, F, and G are collinear
b. $EF = \frac{1}{2} CD$
c. AB = BC
d. DF = DG

29. Which of the following is not sufficient to prove that a quadrilateral is a rhombus? 2745

a. the quadrilateral is a parallelogram with two congruent adjacent sides.
b. the quadrilateral is a square.
*c. the quadrilateral has perpendicular diagonals.
d. the diagonals of the quadrilateral bisect the angles of the quadrilateral.

30. ABCD is a parallelogram if and only if 2746

a. AB = CD and $\angle A \cong \angle D$

b. $\overline{AB} \cap \overline{CD} = \emptyset$ and AB = CD

c. $\overline{AB} \parallel \overline{CD}$ and AD = BC

*d. $\overline{AC}$ and $\overline{BD}$ bisect each other

31. ABCD is a rhombus if 2747

a. $\overline{AC} \perp \overline{BD}$

b. $\overline{AC}$ and $\overline{BD}$ bisect each other

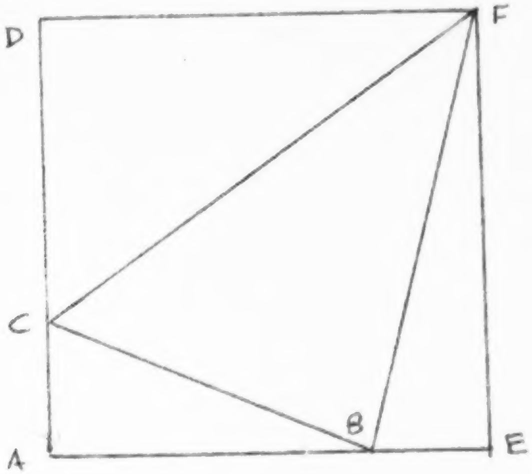
*c. AB = BC = CD and $\overline{AB} \parallel \overline{CD}$

d. $\overline{AC}$ bisects $\angle$ DAB

32. ABCD is an isosceles trapezoid with $\overline{AB} \parallel \overline{CD}$. If E is the midpoint of $\overline{Ab}$, then 2748

*a. DE = CE
b. DE = AD
c. DE = DC
d. DE = EB

THE STUDENT CAN COMBINE KNOWLEDGE OF SIDES AND ANGLES OF TRIANGLES AND QUADRILATERALS WITH PROPERTIES OF ANGLE BISECTORS TO SELECT MEASURES AND CLASSIFY QUADRILATERALS. (2) 0720



In the figure, $\overline{DA} \perp \overline{AE}$, $\overline{CF}$ bisects exterior $\angle DCB$, $\overline{BF}$ bisects exterior $\angle CBE$, $\overline{FD} \perp \overline{AD}$, $\overline{FE} \perp \overline{AE}$.

1. In its smallest classification, AEFD is 2827

a. a rhombus
b. a rectangle
*c. a square
d. a parallelogram

2. The measure of $\angle CFB$ is 2828

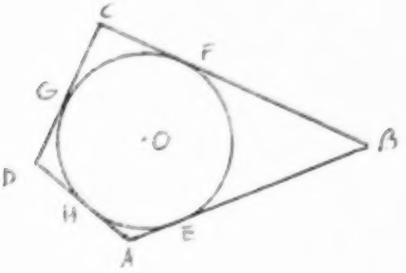
a. undetermined
*b. 45°
c. measure of $\angle BCF$
d. measure of $\angle DFC$

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF THEOREMS ABOUT QUADRILATERALS AND CIRCLES TO SELECT CONCLUSIONS ABOUT INSCRIBED AND CIRCUMSCRIBED POLYGONS. (13) 0740

1. If quadrilateral ABCD can be inscribed in a circle, then which of the following statements is necessarily true? 3077

a. AB = CD and BC = AD
b. $\overline{AC}$ and $\overline{BD}$ bisect each other
*c. the opposite angles are supplementary
d. AC = BD

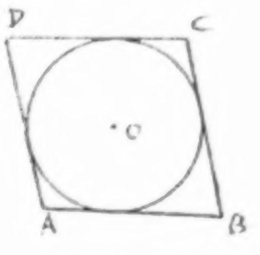
2.



In the figure, if $\odot O$ is inscribed in quadrilateral ABCD, then which of the following is necessarily true? 3078

a. the opposite angles are supplementary
*b. AB + CD = BC + AD
c. CD = AB
d. $\angle B \cong \angle C$

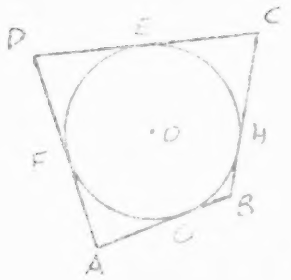
3.



$\odot O$ is inscribed in quadrilateral ABCD as indicated in the figure. If AB = BC, then 3079

a. ABCD is a parallelogram
*b. AD = CD
c. AB = AD
d. CD = AB

4.



ABCD is circumscribed about with points of tangency G,H,E, and F as indicated in the figure. If $\overline{FH}$ and $\overline{EG}$ contain point O, then ABCD in its smallest classification is 3080

*a. a square
b. a rectangle
c. a rhombus
d. a trapezoid

5. A necessary and sufficient condition that a quadrilateral ABCD be inscribable is that 3081

a. its diagonals bisect each other.
b. its angles are right angles.
*c. its opposite angles are supplementary
d. its opposite sides are parallel

6. A necessary and sufficient condition that a quadrilateral be circumscribable is that 3082

a. its opposite sides are parallel
b. it is a rhombus
c. its diagonals bisect the angles of the quadrilateral
*d. the bisectors of its angles are concurrent

7. A convex polygon is circumscribable if and only if 3083

*a. the bisectors of its angles are concurrent
b. it is a reular polygon
c. the perpendicular bisectors of the sides are concurrent
d. all of the angles of the polygon are congruent

8. A convex polygon is inscribable if and only if 3084

a. the polygon is a regular polygon
b. the angle bisectors of the polygon are concurrent
*c. the perpendicular bisectors of the sides of the polygon are concurrent
d. the angles of the polygon are congruent

9. If a circle is inscribed in an in an isosceles trapezoid whose bases have length 4 and 8, then the length of a leg of the trapezoid is 3085

a. $\sqrt{32}$
b. 12
*c. 6
d. $\sqrt{48}$

10. If an isosceles trapezoid is circumscribed about a circle and the median of the trapezoid has length 10 then the length of a leg of the trapezoid is 3086

a. 5
b. undetermined
c. $5\sqrt{2}$
*d. 10

11. An isosceles trapezoid is circumscribed about a circle. If the bases of the trapezoid have length 8 and 2, then the area of the trapezoid is 3087

*a. 20
b. 25
c. 15
d. $5\sqrt{34}$

12. If an isosceles trapezoid with bases of length B_1 and B_2 is circumscribed about a circle, then the area of the trapezoid is 3088

a. undetermined
b. $\frac{1}{2}\sqrt{B_1B_2}\,(B_1 + B_2)$
c. $B_1\,(B_1 + B_2)$
d. $\frac{B_2}{2}\,(B_1 + B_2)$

13. ABCD is a rhombus one of whose angles has measure 60° and the length of one side is 6. If ABCD is circumscribed about $\odot O$ and the points of tangency are joined to form a quadrilateral, then the area of the quadrilateral is 3089

a. $6\sqrt{3}$
b. $3\sqrt{3}$
*c. $\frac{27\sqrt{3}}{4}$
d. $2\sqrt{3}$

THE STUDENT WILL APPLY THE THEOREMS ON MEDIANS OF TRAPEZOIDS AND THE SEGMENT JOINING THE MIDPOINTS OF TWO SIDES OF A TRIANGLE BY CALCULATING MEASURES OF SEGMENTS. (2) 0592

1. Given $\triangle ABC$ such that $d(A,B) = 2x + 3$ $d(B,C) = 5x + 7$, and $d(C,A) = 3x + 2$. If a new triangle is formed by connecting the midpoints of the sides of $\triangle ABC$, then the perimeter of the new triangle is__________. 2126

*a. $5x + 6$
b. $10x + 12$
c. $5x + 8$
d. $30x^3 + 52$
e. none of the above

2. Given quadrilateral ABCD is a trapezoid with bases $\overline{AB}$ and $\overline{DC}$. R and S are midpoints of $\overline{AD}$ and $\overline{BC}$, respectively. If d(R,S) = 18 and d(A,B) = 22 the d (D,C) = ________. 2127

*a. 14
b. 11
c. 9
d. 20
e. 2

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF THE PROPERTIES OF PARALLELOGRAMS BY CHOOSING A FALSE STATEMENT FROM A LIST OF STATEMENTS LISTING THE PROPERTIES. (1) 0682

1. Which of the following statements are false? 2600

a. Opposite sides of a parallelogram are congruent.
b. Opposite angles of a parallelogram are congruent.
c. The diagonals of a parallelogram bisect each other.
d. Consecutive angles of a parallelogram are supplementary.
*e. The diagonals of a parallelogram are congruent.

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF PARALLELOGRAMS AND THEIR SUBSETS BY IDENTIFYING A STATEMENT AS TRUE OR FALSE FROM A GIVEN LIST. (2) 0686

1. Which of the following statements are false 2613

a. Every square is a rhombus
b. Opposite angles of a rhombus are congruent
*c. All rhombi are equiangular
d. Consecutive angles of a rectangle are congruent
e. none of the above

2. Which of the following statements are true? 2614

a. Every rectangle is equilateral
*b. The intersection of the set of all rectangles with the set of all rhombi is the set of all squares
c. If a quadrilateral has congruent diagonals, then the quadrilateral is a rectangle
d. Parallelograms are a subset of trapezoids
e. none of the above

THE STUDENT DEMONSTRATES HIS ABILITY TO ANALYZE AND SYNTHESIZE THE RELATIONSHIP BETWEEN THE NUMBER OF SIDES AND THE NUMBER OF DIAGONALS IN A POLYGON BY CONSTRUCTING A TABLE AND CHOOSING THE NUMBER OF DIAGONALS FOR A GIVEN POLYGON. (1) 0205

Make a table to determine the relationship between the number of sides in a polygon and the number of diagonals in that polygon. Using that table determine how many diagonals a polygon of twenty sides has. 0757

a. 30
b. 50
c. 100
*d. 170
e. none of the above

THE STUDENT DEMONSTRATES KNOWLEDGE OF POLYGON MEASURES BY COMPUTING ANGLE MEASURES IN POLYGONS. (22) 0715

1. In $\triangle ABC$, if $AB = BC$ and $m\angle A = 20^\circ$ then 2777

a. $m\angle B = 80$
b. $m\angle B = 20$
*c. $m\angle B = 140$
d. $m\angle B = 160$

2. The bisectors of two angles of an equilateral triangle intersect to form an angle whose measure in degrees is 2778

a. 150
b. 60
*c. 120
d. 105

3. An exterior angle of a regular polygon of 12 sides has a measure in degrees of 2779

a. 15
*b. 30
c. 45
d. 60

4. If the measure in degrees of one angle of a trapezoid is 40, then the measure in degrees of another angle of the trapezoid is 2780

*a. 140
b. 40
c. 50
d. 160

5. If two consecutive angles of a quadrilateral have measures of 90 degrees each, then 2781

a. the quadrilateral is a square
b. the quadrilateral is a rectangle
c. the other two angles are congruent
*d. the other two angles are supplementary

6. If ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$ and the bisectors of $\angle DAB$ and $\angle ADC$ intersect at E, then 2782

*a. $\overline{AE} \perp \overline{DE}$

b. AE = DE

c. $\angle AED$ is acute

d. $\angle EAD \cong \angle EDA$

7. If $\angle CBD$ is an exterior angle of $\triangle ABC$ and CB = AB, then 2783

a. $\angle CBD$ is obtuse
*b. $m\angle CBD > m\angle A$
c. $\angle CBD$ is acute
d. $m\angle CBD > m\angle CBA$

8. If a polygon has 22 sides, then the sum of the measures of its interior angles (in degrees) is 2784

a. 260
b. 180
c. 1800
*d. 3600

9. If $\triangle ABC$ is a scalene triangle, then 2785

a. its largest angle is obtuse.
b. the measure of its smallest angle (in degrees) is less than 50.
*c. at least one of its angles has a measure (in degrees) greater than 60.
d. the measure of the largest angle is greater than the sum of the measures of the other two angles.

10. If the measure of the largest angle of △ABC is less than the sum of the measures of the other two angles, then 2786

*a. the triangle is an acute triangle
b. the triangle is a scalene triangle
c. the triangle is isosceles
d. the triangle is an obtuse triangle

11. If the measures of the angles of △ABC are in the ratio 3 : 4 : 5, then △ABC is 2787

a. a right triangle
b. an obtuse triangle
*c. an acute triangle
d. an isosceles triangle

12. If the angles of a quadrilateral are all congruent then the quadrilateral is necessarily a 2788

*a. rectangle
b. a square
c. a rhombus
d. a trapezoid

13, If the hypotenuse of a right triangle is twice as long as long as a leg, then the measure of the smallest angle of the triangle (in degrees) is 2789

a. 45
b. 15
*c. 30
d. 60

14. If two of the angles of △ABC have measure (degrees) 40 and 60, then the third angle has measure 2790

a. 100
b. 30
c. 80
d. 90

15, If a convex polygon has 10 sides, then the sum of the measures of its interior angles (in degrees) is 2791

a. 1800
*b. 1440
c. 360
d. 1200

16. Median $\overline{AD}$ of $\triangle ABC$ is half as long as $\overline{BC}$. If $m\angle C = 40$ (degrees), then the measures of $\angle BAC$ and $\angle B$ are 2792

a. undetermined
*b. 90 and 50
c. 40 and 100
d. 80 and 60

17. If the vertex angle of an isosceles triangle has measure 50 (degrees), then the base angles each have measure 2793

a. 40
*b. 65
c. 60
d. 75

18. If the base angles of an isosceles triangle each have measure 30(degrees), then the vertex angle of the triangle has measure 2794

a. 60
b. 75
c. 150
*d. 120

19. In regular pentagon ABCDE, diagonals $\overline{AC}$ and $\overline{AD}$ form an angle of measure (degrees) 2795

a. 30
b. 60
*c. 36
d. 72

20. If $A_1 A_2 A_3 \ldots A_{n-2} A_{n-1} A_n$ is a regular polygon of n sides $(n > 4)$, then diagonals A_1A_3 and A_1A_{n-1} form an angle of measure (degrees) 2796

*a. $\frac{(n-4)\ 180}{n}$

b. $\frac{180}{n}$

c. $\frac{(n-3)\ 180}{2n}$

d. $\frac{(n-2)\ 360}{n}$

21. If $A_1A_2A_3 \ldots A_{n-2} A_{n-1}A_n$ is a regular polygon of n sides $(n \geq 4)$, then diagonals A_1A_3 and A_2A_4 form an acute angle of measure (degrees) 2797

a. $\frac{(n-2)\ 180}{n}$

*b. $\frac{360}{n}$

c. $\frac{180}{n}$

d. $(n-3)\ 90$

22. If each interior angle of a regular polygon of n sides has measure 160 (degrees) then n is 2798

a. 9
b. 20
*c. 18
d. 22

THE STUDENT CAN APPLY A KNOWLEDGE OF SPECIAL SEGMENTS DETERMINED BY MID POINTS OF SIDES OF TRIANGLES AND QUADRILATERALS TO FORM CONCLUSIONS ABOUT POLYGONS. (3) 0726

1. If D, E, and F are the mid-points of the sides of right triangle ABC, then △DEF is 2888

*a. a right triangle
b. an obtuse triangle
c. an acute triangle
d. an isosceles triangle

2. If the mid-points of the sides of a quadrilateral are joined to form a new quadrilateral, the new quadrilateral in its smallest classification is 2889

a. a square
b. a rhombus
*c. a parallelogram
d. a trapezoid

3. If the mid-points of the sides of a rectangle are joined to form a new quadrilateral, then the new quadrilateral in its smallest classification is 2890

a. a square
*b. a rhombus
c. a rectangle
d. a parallelogram

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF PROPERTIES OF TRIANGLES BY DETERMINING IF SPECIFIED CONDITIONS ARE ALWAYS TRUE, SOMETIMES TRUE, OR NEVER TRUE. (9) 0506

1. If $\angle A \cong \angle B$ and $m\angle A + m\angle B = 180$, then $\angle A$ is a right angle. 1871

*a. always
b. sometimes
c. never

2. If $\triangle ABC$ is isosceles, then $\angle A \cong \angle B$. 1872

a. always
*b. sometimes
c. never

3. If line l is a perp. bisector of side $\overline{AB}$ of $\triangle ABC$, then $l \perp \overleftrightarrow{AC}$ or $l \perp \overleftrightarrow{BC}$. 1873

a. always
b. sometimes
*c. never

4. Given $\triangle ABC$ there exists a point $D \in \overline{AB}$, such that $\overleftrightarrow{CD}$ is the perpendicular bisector of $\overline{AB}$. 1874

a. always
*b. sometimes
c. never

5. If $d(C,A) = d(C,B)$, $d(D,A) = d(D,B)$, $C \neq D$, then $\overline{CD} \perp AB$. 1875

a. always
*b. sometimes
c. never

6. If A,B,C are non-collinear points and D is a point such that A-B-D, then $m\angle CAB > m\angle CBD$. 1876

a. always
b. sometimes
*c. never

7. If $\triangle ABC$ is isosceles, then the median to each side is perpendicular to that side. 1877

a. always
*b. sometimes
c. never

8. If $m\angle A \neq m\angle B$ in $\triangle ABC$, then $d(A,C) \neq d(B,C)$. 1878

*a. always
b. sometimes
c. never

9. If a median of a triangle is also an angle bisector, then the triangle is isosceles. 1879

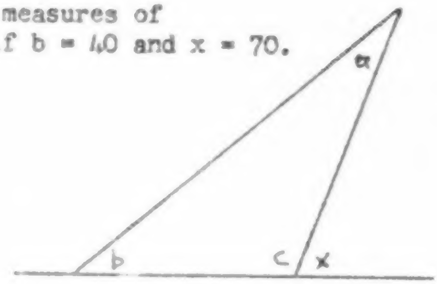
*a. always
b. sometimes
c. never

THE STUDENT WILL DEMONSTRATE HIS COMPREHESION OF MEDIAN, ANGLE BISECTOR, CONGRUENCE, ISOSCELES, AND EXTERIOR ANGLE PROPERTIES OF TRIANGLES BY SELECTING THOSE PROPERTIES WHICH SATISFY A GIVEN CONDITION. (4) 0507

1. In ABC, $\overline{CR}$ is a median to $\overline{AB}$, but $\overline{CR}$ is not perpendicular to $\overline{AB}$, then: 1880

a. $\overline{CR}$ is an angle bisector.
b. insufficient information is given to determine if $\overline{CR}$ is an angle bisector.
c. △ ABC is isosceles
d. △ ABC is not isosceles
*e. insufficient information is given to determine if △ ABC is isoscels.

2. In the figure, a,b,c, and x are measures of the angles indicated. Find a, if b = 40 and x = 70. 1881



a. a = 10
b. a = 20
*c. a = 30
d. a = 40
e. none of these

3. In the figure(above) if c=105, find a+b+x. 1882

a. 75
b. 100
c. 125
*d. 150
e. 210

4. In Δ ABC, m$\angle$ A = m$\angle$ B and m$\angle$C = 2(m$\angle$A +m$\angle$ B). Find m$\angle$A +2 m$\angle$C. 1883

*a. 270
b. 280
c. 290
d. 300
e. 310

THE STUDENT WILL SHOW HIS UNDERSTANDING OF THE 30-60-90 THEOREM, ALTITUDES, AND MEDIANS OF TRIANGLES BY DETERMINING MEASURES AND PROPERTIES THAT HOLD. (6) 0588

1. If a median of a triangle, is one-half as long as the side it bisects, the triangle is 2107

*a. right
b. isosceles
c. scalene
d. equilateral

2. One angle of a rhombus is 60 and one side is 8 inches. The length of the shorter diagonal is 2108

a. 4
*b. 8
c. $4\sqrt{3}$
d. $8\sqrt{3}$
e. none of the above

3. The statement 'if two altitudes of a triangle are equal, the triangle is isosceles' is 2109

*a. always true
b. sometimes true
c. never true

4. The statement 'the altitude of a triangle is always less than any side of a triangle' is — 2110

a. always true
*b. sometimes true
c. never true

5. In parallelogram ABCD, $\overline{DR} \perp \overline{AB}$, m A = 30°, and d(B,C) = 28, then d(D,R) = ? — 2111

a. 28
b. $14\sqrt{3}$
*c. 14
d. insufficient information

6. In parallelogram ABCD, $\overline{DR} \perp \overline{AB}$, and d(D,R) = 12, m A = 30°, then d(A,D) = ? — 2112

a. 12
*b. 24
c. $12\sqrt{3}$
d. insufficient information

THE STUDENT CAN COMBINE A KNOWLEDGE OF SIMILAR TRIANGLES FORMED BY THE ALTITUDE TO THE HYPOTENUSE OF A RIGHT TRIANGLE WITH A KNOWLEDGE OF PROPERTIES OF RIGHT TRIANGLES TO FORM CONCLUSIONS ABOUT SPECIFIC LENGTHS AND ANGLES. (7) — 0717

1. The legs of a right triangle have lengths 6 and 8. The length of the altitude to the hypotenuse is — 2814

a. 10
*b. $4\frac{4}{5}$
c. 5
d. $\sqrt{48}$

2. If $\triangle ABC$ is a right triangle with a right angle at C and $\overline{CD}$ is the altitude to the hypotenuse, then $\angle A$ is congruent to 2815

a. $\angle B$
b. $\angle ADC$
*c. $\angle DCB$
d. $\angle DCA$

3. The altitude to the hypotenuse of a right triangle divides the into whose lengths are 4 and 9. The length of the altitude to the hypotenuse is 2816

*a. 6

b. $\sqrt{13}$

c. $\sqrt{97}$

d. $\sqrt{65}$

4. The legs of a right triangle are $2\sqrt{5}$ and $4\sqrt{5}$. If the altitude is drawn to the hypotenuse, the shortest segment formed has length 2817

a. 1

b. $\sqrt{5}$

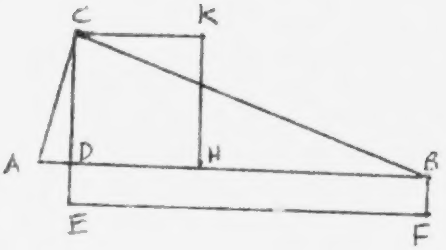
c. 4

*d. 2

5. The hypotenuse of a right triangle has length 12 and one leg of the right triangle has length 6. The median to the hypotenuse forms an angle with the hypotenuse whose measure in degrees is 2818

a. 45
b. 30
*c. 60
d. 90

6. In the figure, $\overline{AC} \perp \overline{CB}$, D is on $\overline{AB}$, AD = DE, CD is a square, and DEFB is a rectangle. What is the relationship between the areas of DEFB and CDHK 2819



- *a. Area CDHK = area DEFB
- b. ARea CDHK < area DEFB
- c. Area CDHK > area DEFB
- d. No relationship is determined

7. In right triangle $\triangle ABC$, the altitude and the median to the hypotenuse $\overline{AB}$ trisect $\angle ACB$. If the length of AB = 8, then the shortest leg of $\triangle ABC$ has length 2820

- a. $4\sqrt{2}$
- *b. 4
- c. $4\sqrt{3}$
- d. not determined

THE STUDENT WILL SHOW UNDERSTANDING OF ALTITUDES OF TRIANGLES BY IDENTIFYING THE PROPERTIES AND DEFINITION OF ALTITUDES. (7) 0590

1. How many altitudes are there in right triangle ABC? 2118

- a. one
- b. two
- *c. three
- d. none

2. An altitude of a triangle is a 2119

a. ray
b. line
c. half-line
*d. segment

3. In triangle ABC, there can be one altitude in the exterior of the triangle (not including the vertices). 2120

*a. never
b. sometimes
c. always

4. In triangle ABC, m∠A is 30 and d(A,B) = 14 then the altitude from B to side AC is? 2121

a. 14
b. $7\sqrt{3}$
c. 8
*d. 7

5. If two altitudes of a triangle are congruent then the triangle is 2122

a. scalene
b. equilateral
*c. isosceles
d. cannot tell from the information that is given

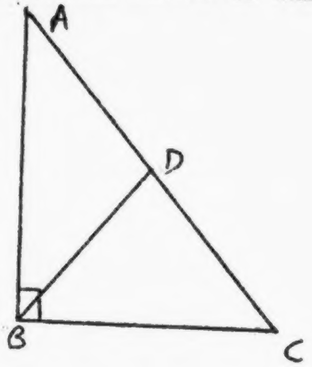
6. In a triangle an altitude can be one of the sides of the triangle. 2123

a. never
*b. sometimes
c. always

7. In a triangle the altitude bisects the angle from which it is drawn. 2124

a. never
*b. sometimes
c. always

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS UNDERSTANDING OF THE RELATIONSHIPS BETWEEN THE HYPOTENUSE AND THE MEDIAN TO THE HYPOTENUSE IN ANY RIGHT TRIANGLE BY COMPUTING THE LENGTH OF ONE OF THEM WHEN GIVEN THE OTHER. (2) 0687



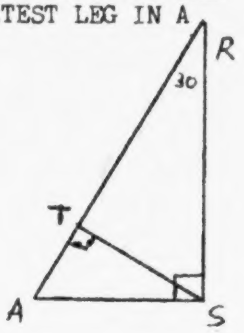
1. If D is the midpoint of $\overline{AC}$, and d(B,D) is 13, then d(A,C) is 2615

a. $7\frac{1}{2}$
b. 13
*c. 26
d. 39
e. not enough information given to solve this problem.

2. If D is the midpoint of $\overline{AC}$, and d(A,B) is 30 then d(B,D) is 2616

a. 10
b. 15
c. 30
d. 60
*e. Not enough information given to solve this problem

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THE RELATIONSHIPS BETWEEN THE HYPOTENUSE AND THE SHORTEST LEG IN A RIGHT TRIANGLE BY CALCULATING THEIR LENGTHS. 0688



If d(A,R) is 40, then D(A,S) is 2617

- a. 10
- *b. 20
- c. 30
- d. 40
- e. not enough information given to solve this problem

If d(T,S) is 12, then d(R,S) is 2618

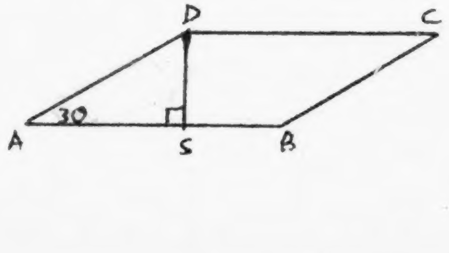
- a. 6
- b. 8
- c. 12
- *d. 24
- e. not enough information given to solve the problem

If d(A,R) is 60, then d(A,T) is 2619

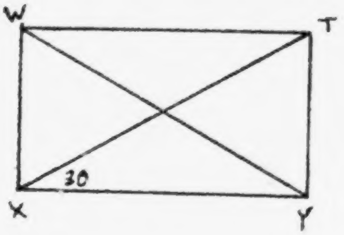
- *a. 15
- b. 30
- c. 60
- d. 120
- e. not enough information given to solve this problem

In parallelogram ABCD if d(D,S) is 14 then d(B,C) is 2620

- a. 7
- b. 14
- c. 21
- *d. 28
- e. not enough information given to solve.



In rectangle WXYT if d(X,W) is 10, then d(X,T) is 2621

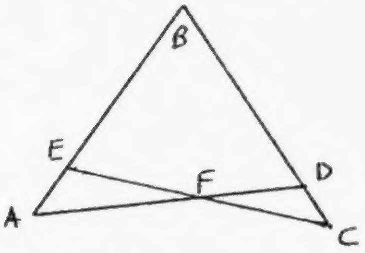


a. 5
b. 10
c. 15
*d. 20
e. Not enough information given to solve this problem

THE STUDENT CAN APPLY THE MEASURE RELATIONSHIPS BETWEEN ANGLES AND SIDES OF TRIANGLES BY INDICATING WHICH OF A LIST OF STATEMENTS ARE TRUE IN SPECIFIC SITUATIONS. 0705

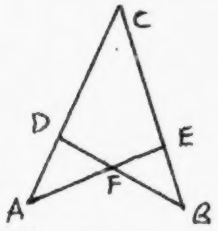
In $\triangle ABC$, if $\angle A \cong \angle B$ then 2704

a. AC = AB
b. $\angle C$ is acute
*c. $\triangle ABC$ is isosceles
d. $\triangle ABC$ is equilateral



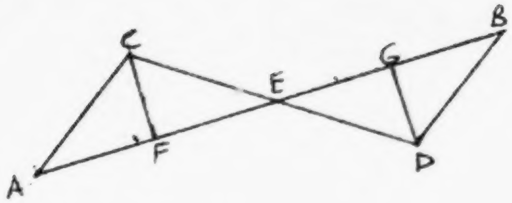
In the figure, if E is on $\overline{AB}$, D is on $\overline{BC}$, AD = DB, and CE = EB, then which of the following is necessary to prove $\angle A \cong \angle C$? 2705

a. AB = CB
b. AD = CE
c. AF = CF and EF = FD
*d. no additional information is necessary



In the figure, if D is on $\overline{AC}$, E is on $\overline{BC}$, AC = BC and AD = BE, $\overline{AE}$ and $\overline{BD}$ intersect at F, then which of the following is not necessarily true? 2706

a. DF = FE
*b. AE = EC
c. AF = FB
d. BF > FE



In the figure, if $\overline{CD}$ and $\overline{AB}$ intersect at E, $\overline{CF}$ and $\overline{DG}$ are altitudes of $\triangle ACE$ and $\triangle BDE$ respectively, and E is the midpoint of $\overline{CD}$, then which of the following is not necessarily true? 2707

*a. AF = BG
b. EF = EG
c. CF = DG
d. $\angle FCF \cong \angle GDE$

THE STUDENT CAN APPLY HIS KNOWLEDGE OF RELATIONSHIPS BETWEEN SIDES OF TRIANGLES AND SEGMENTS FORMED BY ANGLE BISECTORS TO FIND LENGTHS IN SPECIFIC TRIANGLE PROBLEMS. 0718

In $\triangle ABC$, $\overline{AD}$ is the angle bisector of $\angle BAC$. If AB = 4, AC = 6 and BD = 2, then BC has length 2821

a. 6
*b. 5
c. 3
d. 7

If $\angle DAB$ is an exterior angle for $\triangle ABC$, $\overline{AE}$ bisects $\angle DAB$, B is between C and E, AB = 4, AC = 8, and BC = 5 then the length of $\overline{BE}$ is 2822

a. 10
b. 6
*c. 5
d. $\sqrt{20}$

In $\triangle ABC$, if D is on $\overline{AB}$, AD = 3, DB = 4, CA = 6 and CB = 8, then $\overline{CD}$ is 2823

a. a median in $\triangle ABC$
b. an altitude in $\triangle ABC$
*c. an angle bisector in $\triangle ABC$
d. perpendicular to $\overline{AB}$

The legs of an isosceles triangle have length 10 and the length of the base is 12. The shortest segment of a leg formed by the bisector of the opposite angle has length 2824

a. 3
b. 4
c. 4 3/11
*d. 4 6/11

THE STUDENT CAN APPLY A KNOWLEDGE OF PROPORTIONS IN SIMILAR TRIANGLES AND ANGLE MEASURES IN CIRCLES TO FIND SPECIFIC SEGMENT MEASURES. 0719

In $\odot O$, chords $\overline{AB}$ and $\overline{CD}$ intersect at E. If AE = 2, EB = 6 and CE = 4, then the length of ED is 2825

a. 8
*b. 3
c. $\sqrt{12}$
d. 5

A secant segment and a tangent segment are drawn from an external point A to $\odot O$. If the circle divides the secant segment into two segments of length 4 and 5, then the length of the tangent segment is 2826

a. $\sqrt{20}$
b. 3
*c. 6
d. $\sqrt{41}$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF INCLUDED SIDES AND INCLUDED ANGLES BY DETERMINING WHICH SIDES AND ANGLES ARE INCLUDED IN A GIVEN TRIANGLE. 0657

In a triangle XYZ, which side is included between angles X and Z? 2527

a. $\overline{XY}$
b. $\overline{YZ}$
*c. $\overline{XZ}$

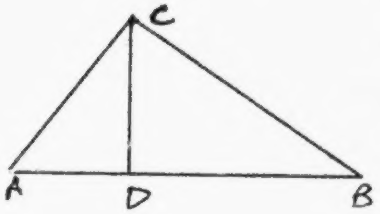
In triangle LKO, which angle is included between sides LO and KL? 2528

*a. angle L
b. angle K
c. angle O

THE STUDENT CAN SHOW HIS COMPREHENSION OF CORRESPONDENCE TRIANGLES BY STATING SUCH CORRESPONDENCE GIVEN A SET OF TRIANGLES. 0570

Given triangle ABC, A-D-B, and $\overline{CD}$ such that ABC $\leftrightarrow$ ACD which of the following list correctly states the correspondence between the sides and angles? 2048

a. $\overline{AC} \leftrightarrow \overline{AC}$, $\overline{CD} \leftrightarrow \overline{CB}$, $\overline{AD} \leftrightarrow \overline{AB}$
$\angle A \leftrightarrow \angle A$, $\angle ACD \leftrightarrow \angle ACB$, $\angle CDA \leftrightarrow \angle CBD$
b. $\overline{AC} \leftrightarrow \overline{CB}$, $\overline{AD} \leftrightarrow \overline{DB}$, $\overline{CD} \leftrightarrow \overline{CD}$
$\angle A \leftrightarrow \angle B$, $\angle ACD \leftrightarrow \angle BCD$, $\angle ADC \leftrightarrow \angle BDC$
c. $\overline{AD} \leftrightarrow \overline{CD}$, $\overline{CD} \leftrightarrow \overline{CB}$, $\overline{AC} \leftrightarrow \overline{AB}$
$\angle A \leftrightarrow \angle BCD$, $\angle ACD \leftrightarrow \angle B$, $\angle ACD \leftrightarrow \angle BDC$
*d. $\overline{AC} \leftrightarrow \overline{AB}$, $\overline{CD} \leftrightarrow \overline{CB}$, $\overline{AD} \leftrightarrow \overline{AC}$
$\angle D \leftrightarrow \angle C$, $\angle A \leftrightarrow \angle A$, $\angle ACD \leftrightarrow \angle ABC$



THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF CORRESPONDENCE BETWEEN TRIANGLES BY CHOOSING THE PROPER CORRESPONDENCE BETWEEN THE SIDES AND ANGLES. 0654

If triangle ABC $\leftrightarrow$ triangle RST, then angle B corresponds to 2516

a. angle T
b. angle R
*c. angle S
d. segment RS
e. segment ST

If triangle WOT ↔ triangle TOS then side OT corresponds with 2517

a. segment TO
b. segment TS
*c. segment OS
d. angle O
e. angle S

If angle R corresponds with angle S, angle O corresponds to angle W, and segment NR corresponds to segment BS, then 2518

a. triangle ROB corresponds with SWN
b. triangle RON corresponds with BWS
c. triangle RNO corresponds with triangle SWB
*d. triangle NOR corresponds with triangle BWS
e. none of the above

THE STUDENT CAN APPLY THE CONCEPTS OF SIMILAR TRIANGLES TO SELECT CORRECT CONSEQUENCES FOR GIVEN ANTECEDENTS. 0733

If $\overline{AB}$ and $\overline{CD}$ intersect at E and $\triangle AEC \sim \triangle BED$, then 2999

a. $AE = BE$
*b. $AE \cdot ED = CE \cdot EB$
c. $\angle A \cong \angle D$
d. $\angle C = \angle BED$

Two isosceles triangles are similar if 3000

a. their bases are congruent
b. a leg of one triangle is congruent to a leg of the other
*c. they are right triangles
d. they are acute triangles

If $\triangle ABC \sim \triangle XYZ$ and $\triangle XYZ \cong \triangle RST$, then 3001

*a. $\angle A \cong \angle R$
b. $BC = RS$
c. $\frac{AC}{RT} = \frac{BC}{RS}$
d. $\angle C \cong \angle S$

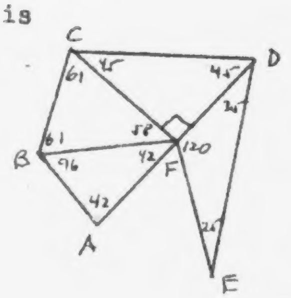
THE STUDENT WILL APPLY THE INEQUALITY THEOREMS OF TRIANGLES BY DETERMINING THE SHORTEST SIDE(S) IN A GIVEN TRIANGLE. 0589

In triangle XYZ, m∠y = 37 and m∠z = 71, then the longest side is 2113

a. $\overline{XY}$
*b. $\overline{YZ}$
c. $\overline{XZ}$
d. $\overline{XY}$ and $\overline{YZ}$

In the drawing below, the shortest segment is 2114

a. $\overline{FB}$
b. $\overline{AF}$
c. $\overline{CD}$
*d. $\overline{BC}$
e. $\overline{FE}$



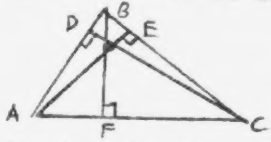
In triangle ABC, if m ∠B = 80, then 2115

a. AC ≅ BC
b. d(AC) < d(B,C)
c. d(A,C) > d(B,C)
*d. the relationship between AC and BC cannot be determined. 2115

In triangle ABC, d(A,C) > d(A,B). If D is any point between B and C, then 2116

a. d(A,D) = d(A,C)
b. d(A,D) > d(A,C)
*c. d(A,D) < d(A,C)
d. the relationship between AC and BC cannot be determined.

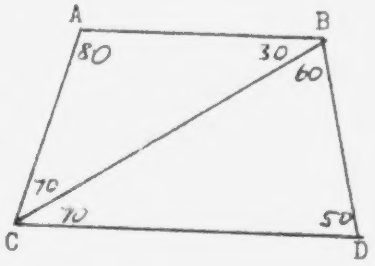
Given the following diagram, then 2117



*a. d(A,B) + d(B,C) + d(A,C) > d(A,E) + d(C,D) + d(B,F)
b. d(A,B) + d(B,C) + d(A,C) = d(A,E) + d(C,D) + d(B,F)
c. d(A,B) + d(B,C) + d(A,C) < d(A,E) + d(C,D) + d(B,F)
d. the above relationship cannot be determined.

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF INEQUALITIES IN TRIANGLES BY SELECTING THE LARGEST OR SMALLEST SIDE OR ANGLE. 0689

In the adjacent figure, which side is the largest 2622



a. $\overline{AB}$
b. $\overline{AC}$
c. $\overline{BC}$
d. $\overline{CD}$
*e. $\overline{BD}$

In the above figure, which side is the smallest? 2623

a. $\overline{AB}$
*b. $\overline{AC}$
c. $\overline{BC}$
d. $\overline{CD}$
e. $\overline{BD}$

In triangle RST, angle R is 54° and angle S is 67°. Which side is longest? 2624

a. $\overline{RS}$
b. $\overline{ST}$
*c. $\overline{RT}$

THE STUDENT CAN DEMONSTRATE AN ABILITY TO APPLY INEQUALITY PRINCIPLES BY SELECTING TRUE STATEMENTS ABOUT SPECIFIC TRIANGLES. 0728

In $\triangle ABC$, if $m\angle A = 56^\circ$ and $m\angle B = 68^\circ$, then the longest side of $\triangle ABC$ is 2900

a. BC
b. AB
*c. AC
d. undetermined

If $\triangle ABC$ is isosceles with $AC = BC$ and $AC > AB$, then which of the following is true? 2901

a. $m\angle C > m\angle B$
*b. $m\angle C < 60$
c. $m\angle A > m\angle B$
d. $m\angle C \geq \frac{1}{2}(m\angle A + m\angle B)$

If $\triangle ABC$ is isosceles with $AB = AC$, and D is on $\overline{BC}$, then 2902

a. $AD \geq BC$
b. $BD < DC$
c. $CD > AB$
*d. $AD \leq AB$

If $\overline{AD}$ is an angle bisector in $\triangle ABC$ and E is between A and D, then which of the following is necessarily true? 2903

a. $m\angle AEB > m\angle CAB$
*b. $m\angle AEB > \frac{1}{2} m\angle CAB$
c. $m\angle AEB > m\angle CBA$
d. $m\angle AEB < m\angle CAB$

If $\overline{AD}$ is a median of $\triangle ABC$ and E is between A and D, then 2904

*a. $m\angle AEB > m\angle C$
b. $AD > BC$
c. $m\angle AEB > m\angle CDA$
d. $m\angle DEB > m\angle CDA$

If $\overline{CD}$ is a median of $\triangle ABC$ and $m\angle CDA > m\angle CDB$, then 2905

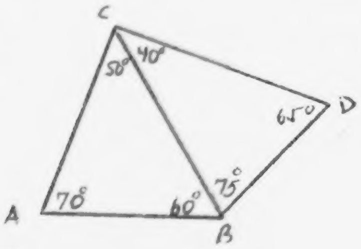
a. $\triangle ABC$ is scalene
b. $AC < BC$
*c. $m\angle B > m\angle A$
d. $m\angle ACD > m\angle DCB$

In $\triangle ABC$, if $AC > AB$ and $\overline{AD}$ is an altitude of the triangle, then 2906

a. $AD < BD$
b. $BD > DC$
c. $DC < AD$
*d. $m\angle DAC > m\angle DAB$

If D is a point in the interior of $\triangle ABC$, then 2907

a. $AD + DB > DC$
*b. $AD + DB + DC < AB + BC + AC$
c. $m\angle ADB < m\angle CDB$
d. $\angle ADB$ is obtuse



In the figure, if the measures of the angles are as indicated, then the longest segment in the figure is 2908

*a. $\overline{CD}$
b. $\overline{AC}$
c. not determined
d. $\overline{BC}$

If $\overline{CD}$ is an altitude of $\triangle ABC$ and $AD > DB$ then 2909

a. $AC > AB$
b. $AC < AB$
*c. $AC > BC$
d. $AC < BC$

If an exterior angle of $\triangle ABC$ has measure 160 (degrees), then 2910

a. the triangle is an acute triangle
b. the triangle is an obtuse triangle
*c. two of the angles of the triangle each have measures less than 160°
d. the triangle is a right triangle

If ABCD is a quadrilateral and $\overline{CD}$ is the longest side, then 2911

a. $CD > DB$
b. $m\angle A > m\angle C$
c. $m\angle DBC > m\angle C$
*d. $m\angle DBC > m\angle BDC$

In $\triangle ABC$, if D is between A and B and $AD = CB$, then 2912

a. $AD = DC$
b. $AD < DB$
c. $AC > AB$
*d. $AC > DB$

If $\overline{BD}$ and $\overline{CE}$ are altitudes of $\triangle ABC$ and $AB > AC$, then 2913

a. $CE > BD$
b. $m\angle ACE > m\angle ABD$
*c. $BD > CE$
d. $m\angle BCE > m\angle ACE$

If ABCD is a quadrilateral, then 2914

*a. $AC + BD < AB + BC + CD + DA$
b. $AC + BD > AB + BC + CD + DA$
c. $AC > AB$
d. $AB + AD > AC$

If the medians of $\triangle ABC$ meet at D and $AC < BC$, then 2915

a. $CD > AD$
*b. $DB > AD$
c. $CD < AD$
d. $DB < AD$

If D is any point in the interior of $\triangle$ ABC, then 2916

*a. $AB + BC > AD + DC$
b. $\angle ADB$, $\angle CDB$, and $\angle CDA$ are obtuse angles
c. $AD < AB$
d. $AD < AC$

If $\triangle ABC$ is equilateral and D is any point on $\overline{AB}$, then 2917

a. ADC is obtuse
b. $AB > DB$
*c. $CD \leq AB$
d. $CD = DB$

If $\triangle ABC$ is isosceles with $AB = BC$ and D is any point between A and B, then 2918

a. $AB < BD$
*b. $AB > BD$
c. $m\angle CDB > m\angle B$
d. $CD < AC$

In square ABCD, the diagonals intersect at E. If F is the mid-point of $\overline{EC}$, then 2919

a. $AF = AD$
b. $AF < AD$
*c. $AF > AD$
d. $AF = DF$

D is a point in the interior of acute $\angle ABC$ where the distances from D to $\overline{AB}$ and $\overline{BC}$ are DE and DF respectively. If $DE > DF$, then 2920

a. $\triangle BEF$ is scalene
b. $BD < BE$
*c. $BE < BF$
d. $BE > BF$

If ABCD is a rectangle whose diagonals intersect at E and F is the mid-point of $\overline{BC}$, then 2921

a. $EF = AE$
b. $EF > CF$
*c. $EF < AE$
d. $EF > DE$

In $\odot O$, if the length of $\overset{\frown}{AB}$ is less than the length of $\overset{\frown}{BC}$, and ABC is drawn, then 2922

- a. $OB > AC$
- *b. $m\angle C < m\angle A$
- c. $m\angle A > m\angle B$
- d. $\triangle ABC$ is a scalene triangle

$\overline{AB}$ and $\overline{CD}$ are chords of $\odot O$. If the distance from O to $\overline{AB}$ is 3 and the distance from O to $\overline{CD}$ is 4, then 2923

- a. $AB > CD$
- *b. $AB < CD$
- c. $OC > CD$
- d. $OA > AB$

In $\triangle ABC$, if $AB = 7$, $BC = 5$ and $AC = 9$, then 2924

- a. $m\angle C = 35$
- *b. $m\angle B > m\angle A$
- c. $AB + BC < AC$
- d. $m\angle A > m\angle C$

In $\triangle ABC$, if $AB = 5$, and $BC = 8$ then AC is 2925

- a. less than 3
- b. between 2 and 14
- *c. between 3 and 13
- d. greater than 13

THE STUDENT CAN APPLY THE PYTHAGOREAN THEOREM AND ITS CONVERSE TO DETERMINE ANGLES OR SIDES OF SPECIFIC RIGHT TRIANGLES. 0716

If $\triangle ABC$ is a right triangle with $\angle C$ a right angle, $AC = 6$, $BC = 8$, then AB is 2799

- a. 14
- b. 28
- *c. 10
- d. 7

If the length of the hypotenuse of a right triangle is 15 and the length of one leg is 12, then the length of the other leg is 2800

*a. 9

b. $3\sqrt{41}$

c. $\frac{27}{2}$

d. $6\sqrt{5}$

If the sides of $\triangle$ABC are in the ratio 2: 3: 4, then $\triangle$ ABC is 2801

a. an acute triangle
*b. an obtuse triangle
c. a right triangle
d. an isosceles triangle

Which of the following triplets are the lengths of the sides of a right triangle? 2802

a. 23, 21, 9
b. 13, 7, 11
c. 6, 7, 10
*d. 41, 9, 40

$\overline{AB}$ is a diameter of $\odot O$ and C is a point of the circle. If AC = 12 and BC = 5 then the radius of the circle is 2803

a. 5
b. $8\frac{1}{2}$
*c. $6\frac{1}{2}$
d. 13

The length of one side of an equilateral triangle is 6. The length of an altitude of the triangle is 2804

a. 3
b. $\frac{3}{2}\sqrt{3}$
c. 5
*d. $3\sqrt{3}$

The lengths of the sides of a rectangle are 20 and 21. The radius of the circumscribed circle is 2805

a. 29
*b. $14\frac{1}{2}$
c. $\frac{41}{2}$
d. $\sqrt{20 \cdot 21}$

The lengths of the diagonals of a rhombus are 12 and 16. The length of one side of the rhombus is 2806

*a. 10
b. 14
c. 20
d. $\sqrt{122}$

The lengths of the diagonals of a rhombus are 6 and 8. An altitude of the rhombus has length 2807

a. $\sqrt{6 \cdot 8}$
b. $\sqrt{6^2 + 8^2}$
*c. $4\frac{4}{5}$
d. 5

The radius of $\odot O$ is 10. If $\overline{AB}$ is a chord of the circle and $AB = 4$, then the distance from O to $\overline{AB}$ is 2808

a. 3
b. $\sqrt{84}$
c. $2\sqrt{5}$
*d. $4\sqrt{6}$

The bases of an isosceles trapezoid have lengths 20 and 28. If the legs of the trapezoid have length 5, then the altitude of the trapezoid has length 2809

*a. 3
b. $\sqrt{41}$
c. 4
d. $\sqrt{28^2 - 20^2}$

The radius of the inscribed circle of square ABCD has length 4. The radius of the circumscribed $\odot$ for ABCD is 2810

a. 8
b. $8\sqrt{2}$
*c. $4\sqrt{2}$
d. $2\sqrt{2}$

Points A, B, and C divide $\odot O$ into three congruent arcs. If the radius of $\odot O$ has length 6, then the radius of the inscribed circle of $\triangle ABC$ is 2811

*a. 3
b. $6\sqrt{3}$
c. $3\sqrt{3}$
d. $\frac{3}{2}\sqrt{3}$

$\triangle ABC$ is an equilateral triangle the lengths of whose sides are 6 and D is a point such that DA = DB = DC = 5. What is the distance from D to the plane ABC? 2812

a. $\sqrt{61}$
b. 4
c. $\sqrt{11}$
*d. $\sqrt{13}$

The legs of an isosceles triangle have length 13 and the base has length 10. Find the length of the median to the base of the isosceles triangle. 2813

*a. 12
b. 10
c. 5
d. $\sqrt{69}$

THE STUDENT CAN APPLY THE PYTHAGOREAN THEOREM AND AREA FORMULAS TO COMPUTE AREAS OF SPECIFIC POLYGONS. 0731

If the hypotenuse of a right triangle has length 13 and the length of one leg of the triangle is 12, then the area of the triangle is 2943

a. 65
b. 36
*c. 30
d. undetermined

In △ABC, if AB = 20 and altitude CD = 6, then the area of △ABC is 2944

a. 120
*b. 60
c. 48
d. undetermined

If the diagonal of a rectangle has length 10 and one side has length 6 then the area of the rectangle is 2945

*a. 48
b. 30
c. 60
d. undetermined

If △ABC is isosceles with AB = AC = 5 and BC = 6, then the area of △ABC is 2946

a. 6
b. 30
c. 15
*c. 12

If the two legs of a right triangle have lengths 6 and 8, then the length of the altitude to the hypotenuse is 2947

a. 5
*b. 4 4/5
c. 3 4/5
d. undetermined

If a diagonal of a square has length 10, then the area of the square is 2948

*a. 50
b. 100
c. $50\sqrt{2}$
d. $100\sqrt{2}$

If the diagonals of a rhombus have length 6 and 8, then the area of the rhombus is 2949

a. 25
b. 30
*c. 24
d. 48

If the length of one side of an equilateral triangle is 6, then the area of the triangle is 2950

*a. $9\sqrt{3}$
b. 18
c. 9
d. $18\sqrt{3}$

If the area of an equilateral triangle is 100, then the length of one side of the triangle is 2951

a. 10
b. $10\sqrt{3}$
c. $\frac{10}{3}\sqrt[4]{9}$
*d. $\frac{20}{3}\sqrt[4]{27}$

If an altitude of an equilateral triangle is $10\sqrt{3}$, then the area of the triangle is 2952

a. $50\sqrt{3}$
*b. $100\sqrt{3}$
c. $200\sqrt{3}$
d. 100

If the sides of a parallelogram have length 10 and 12 and one of the angles of the parallelogram has measure 30°, then the area of the parallelogram is 2953

a. 120
b. $60\sqrt{3}$
*c. 60
d. $120\sqrt{3}$

If the sides of a rhombus have length 10 and one angle of the rhombus has measure 45°, then the area of the rhombus is 2954

a. 100
b. $100\sqrt{2}$
c. $25\sqrt{2}$
*d. $50\sqrt{2}$

If one angle of a parallelogram has measure 30°, then the area of the parallelogram is 2955

*a. twice the product of the length of the two altitudes of the parallelogram.
b. the product of the length of the two altitudes of the parallelogram.
c. one-half the product of the length of the diagonals of the parallelogram.
d. the product of the lengths of the sides of the parallelogram.

If the diagonals of a parallelogram have length 20 and 40 and form an angle of measure 30°, then the area of the parallelogram is 2956

a. $400\sqrt{3}$
b. $200\sqrt{3}$
*c. 200
d. 400

If the sides of a triangle are 7, 24, and 25, then the area of the triangle is 2957

*a. 84
b. 300
c. 168
d. $87\frac{1}{2}$

If the radius of the inscribed circle of $\triangle ABC$ has length "k" and the perimeter of the triangle is "p" then the area of the triangle is 2958

a. pk
*b. $\frac{1}{2}$ pk
c. $\left(\frac{k+p}{2}\right) \cdot p$
d. undetermined

If a unit of area called "goo" is defined as the area of an equilateral triangle with sides of length 1, then the area of a rectangle whose sides have length 6 and 9 is 2959

a. 27 goo
b. $144\sqrt{3}$ goo
c. 54 goo
*d. $72\sqrt{3}$ goo

$\triangle ABC$ is a right triangle with $\angle C$ a right angle. If AB = 5 and AC = 3, and D is the midpoint of BC, then the area of $\triangle ADB$ is 2960

a. $7\frac{1}{2}$
b. 12
*c. 3
d. 6

If the length of one side of a regular hexagon is 6, then the area of the hexagon is 2970

a. 108
b. $9\sqrt{3}$
c. 90
*d. $54\sqrt{3}$

If the radius of $\odot O$ is $6\sqrt{3}$, then the area of an equilateral triangle inscribed in $\odot O$ is 2971

*a. $81\sqrt{3}$
b. $27\sqrt{3}$
c. 81
d. $54\sqrt{3}$

If the radius of $\odot O$ is $5\sqrt{2}$, then the area of a square inscribed in $\odot O$ is 2972

a. 50
*b. 100
c. $50\sqrt{2}$
d. $100\sqrt{2}$

If ABCDEF is a regular hexagon inscribed in a circle of radius 12, then the area of $\triangle$ AFE is 2973

a. 72
b. $72\sqrt{3}$
*c. $36\sqrt{3}$
d. 36

If ABCDEF is a regular hexagon inscribed in a circle of radius 12, then the area of $\triangle$ AEB is 2974

a. $144\sqrt{3}$
b. 72
*c. $72\sqrt{3}$
d. $54\sqrt{3}$

If ABCDEF is a regular hexagon with sides of length 10, then the area of ABDE is 2975

*a. $100\sqrt{3}$
b. $50\sqrt{3}$
c. $\frac{25}{4}\sqrt{3}$
d. $\frac{75}{4}\sqrt{3}$

ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 10, DC = 4, AD = 3 and DA ⊥ AB, then the area of ABCD is 2976

a. 30
b. 42
c. 20
*d. 21

ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 10, DC = 4, AD = 8 and $\overline{BC} \perp \overline{AB}$, then the area of ABCD is 2977

*a. $14\sqrt{7}$
b. 56
c. 70
d. $21\sqrt{7}$

ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = AD = DB = 8 and CD = 5, then the area of ABCD is 2978

a. $20\sqrt{3}$
b. 52
*c. $26\sqrt{3}$
d. 26

ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 10, AD = 6, CD = 4 and $\overline{BD} \perp \overline{AD}$, then the area of ABCD is 2979

a. 21
*b. 33 3/5
c. 42
d. 8 2/5

ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 8, AD = DB = 5, and CD = 2, then the area of ABCD is 2980

a. 25
b. $12\frac{1}{2}$
c. $12\sqrt{3}$
*d. 15

ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 20, CD = 10, AD = 8 and $m\angle A = 45^\circ$, then the area of ABCD is 2981

*a. $60\sqrt{2}$
b. $120\sqrt{2}$
c. $30\sqrt{2}$
d. $45\sqrt{2}$

ABCD is an isosceles trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 16, CD = 8 and AD = 5, then the area of ABCD is 2982

a. 60
b. 72
*c. 36
d. 48

ABCD is an isosceles trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 10, CD = 8 and $\overline{AC} \perp \overline{BD}$, then the area of ABCD is 2983

a. $81\sqrt{2}$
*b. 81
c. $162\sqrt{2}$
d. $40\sqrt{2}$

$\triangle ABC$ is an equilateral triangle and D and E are midpoints of $\overline{AC}$ and $\overline{BC}$ respectively. If AB = 9, then the area of ABED is 2984

*a. $\frac{243}{16}\sqrt{3}$
b. $\frac{81}{4}\sqrt{3}$
c. $54\sqrt{3}$
d. $\frac{243}{4}\sqrt{3}$

ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If the distance from A to $\overleftrightarrow{CD}$ is 7 and the length of the segment joining the midpoints of the non-parallel sides of the trapezoid is 10, then the area of ABCD is 2985

a. 119
*b. 70
c. undetermined
d. 35

ABCD is a trapezoid with $\overline{AB} \parallel \overline{CD}$. If AB = 16, CD = 10 and the distance between AB and CD is 6, then the segment joining the mid-points of the two non-parallel sides of the trapezoid divides the trapezoid into two regions whose areas have the ratio 2986

a. 5 : 8
b. 1 : 1
*c. 23 : 29
d. 10 : 13

THE STUDENT CAN SHOW HIS KNOWLEDGE OF THE CONDITIONS FOR CONGRUENT TRIANGLES BY LISTING THE NECESSARY CONDITIONS FOR CONGRUENCE. 0571

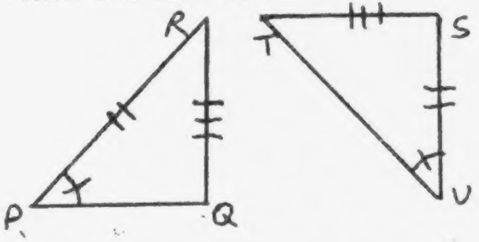
Given triangle ABC and triangle DEF and the two following statements 1) $\angle A \cong \angle D$, $\angle B \cong \angle E$, $\angle C \cong \angle F$ and 2) $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, $\overline{AC} \cong \overline{DF}$ to conclude that $\triangle ABC \cong \triangle DEF$ by definition, which of the following statements is correct. 2049

a. only statement 1 is necessary
*b. only statement 2 is necessary
c. neither is necessary
d. both statement 1 and 2 are necessary

THE STUDENT CAN SHOW HIS UNDERSTANDING OF CONGRUENT TRIANGLES BY DETERMINING IF A GIVEN PAIR OF TRIANGLES ARE CONGRUENT AND IF SO FOR WHAT REASON. 0572

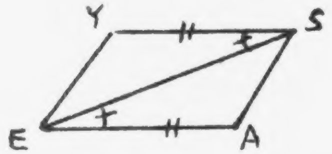
Given the following figure as marked. Then the conclusion is that △ PQR and △UST are ______. 2050

a. congruent, because of SAS
b. congruent, because of ASA
c. congruent, because of SSS
d. congruent, because of SSA
*e. not congruent



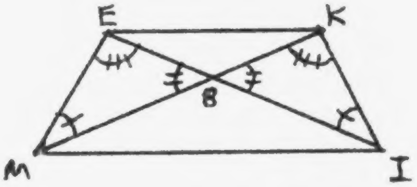
Given the following figure as marked. Then a valid conclusion would be that △EAS and △SYE are ______. 2051

*a. congruent, because of SAS
b. congruent, because of ASA
c. congruent, because of SSS
d. congruent, because of SSA
e. not congruent



Given figure MIKE as marked, then a valid conclusion is that △IKB and △MEB are ______. 2052

a. congruent, because of SAS
b. congruent, because of ASA
c. congruent, because of AAA
d. congruent, because of SSA
*e. not congruent

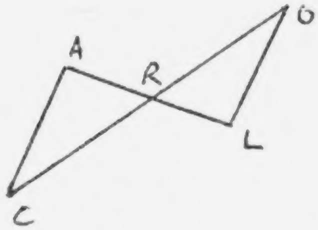


THE STUDENT CAN ANALYZE A GIVEN SET OF CONDITIONS CONCERNING CONGRUENT TRIANGLES TO SELECT WHICH CONGRUENCE CORRESPONDENCE IS SATISFIED OR NECESSARY. 0573

Given a triangle HIN with $\overline{NS} \perp \overline{HI}$ and S the midpoint of $\overline{HI}$, what congruence postulate would it be necessary to use in order to conclude that triangle HSN is congruent to triangle ISN? 2053

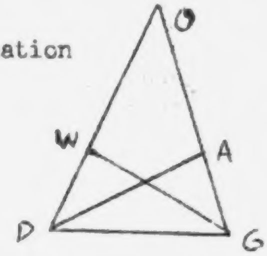
*a. SAS
b. AAA
c. SSA
d. ASA
e. SSS

Given the figure as marked such that R is the midpoint of $\overline{AL}$ and $\overline{CO}$, then which one of the following statements is true about triangle CAR and triangle OLR? 2054



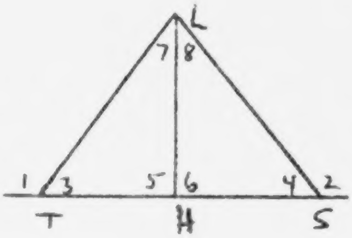
a. they are not congruent
*b. they are congruent because of SAS
c. they are congruent because of SSS
d. they are congruent because of ASA

Given the following figure such that $\overline{WG} \perp \overline{DO}$, $\overline{DA} \perp \overline{OG}$, and $\overline{WO} \cong \overline{AO}$, which of the following statements is correct relating triangle DOA and GOW? 2055



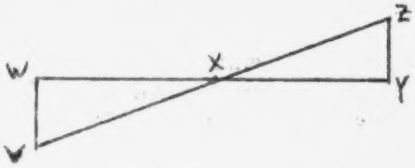
a. Not congruent, insufficient information
*b. congruent, ASA
c. congruent, SAS
d. congruent, AAA
e. congruent, SSS

Given the following figure such that $\angle 1 \cong \angle 2$, and $\overline{LT} \cong \overline{LS}$, which of the following statements is correct relating triangle LTH and triangle LSH? 2056



*a. Not congruent
b. congruent, because of CPCTC
c. congruent, because of SAS
d. congruent, because of SSA
e. congruent, because of ASA

Given the following figure such that X is the midpoint of $\overline{WY}$, $\overline{WV} \perp \overline{WY}$, and $\overline{YZ} \perp \overline{WY}$, then which one of the following statements is true about triangle WVX and triangle YZX? 2057



a. Congruent because of SAS
b. Congruent because of CPCTC
c. Congruent because of SSS
*d. Congruent because of ASA
e. Not Congruent

THE STUDENT CAN SHOW HIS KNOWLEDHE OF THE DEFINITIONS OF THE CLASSIFICATIONS OF A TRIANGLE ACCORDING TO THE NUMBER OF CONGRUENT SIDES BY IDENTIFYING THE KIND OF TRIANGLE OR THE NUMBER OF CONGRUENT SIDES. 0574

A triangle with NO congruent sides is called a(n) _____. 2058

a. isosceles triangle
b. equilateral triangle
c. equiangular triangle
*d. scalene triangle
e. none of the above

A triangle with two congruent sides is called a(n) ______. 2059

*a. isosceles triangle
b. equilateral triangle
c. equiangular triangle
d. scalene triangle
e. none of the above

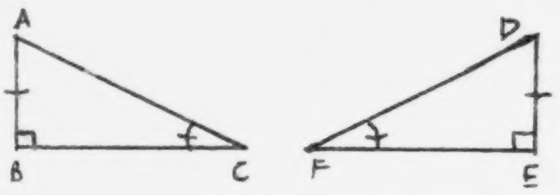
In order to prove a triangle to be equilateral, by definition, it is necessary to show which of the following? 2060

a. two angles congruent
b. three angles congruent
c. two sides congruent
*d. three sides congruent
e. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF TRIANGLE CONGRUENCY BY DETERMINING WHICH METHODS (ASA, SAS, SSS) CAN BE USED TO PROVE TWO TRIANGLES CONGRUENT. 0658

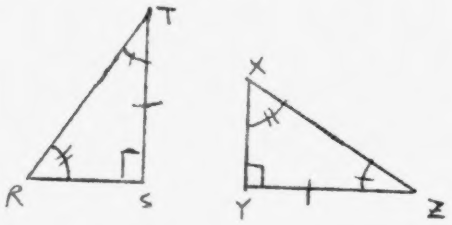
The two triangles ABC and DEF can be proved congruent only by 2529

a. ASA only
b. SAS only
c. SSS only
d. ASA and SAS
e. SSS and SAS
*f. cannot be proved congruent



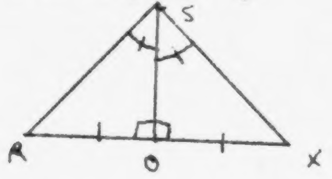
The two triangles RST and XYZ can be proved congruent by 2530

a. ASA only
b. SAS only
c. SSS only
*d. ASA and SAS
e. SSS and SAS
f. cannot be proved congruent



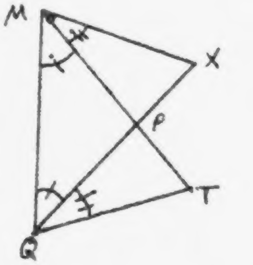
The two triangles Ros and XOS can be proved congruent by 2531

a. ASA only
b. SAS only
c. SSS only
*d. ASA and SAS
e. SAS and SSS
f. cannot be proved congruent



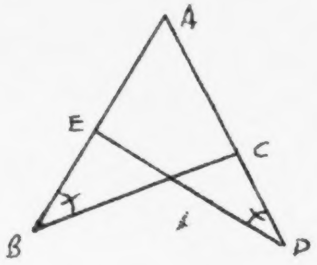
The two triangles MTQ and QXM can be proved congruent by 2532

*a. ASA only
b. SAS only
c. SSS only
d. ASA and SAS
e. SAS and SSS
f. cannot be proved congruent

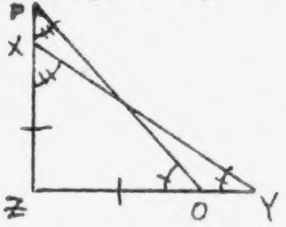


The two triangles ABC and ADE (with $\overline{AB} \cong \overline{AD}$) can be proved congruent 2533

*a. ASA only
b. SAS only
c. SSS only
d. ASA and SAS
e. SAS and SSS
f. cannot be proved congruent

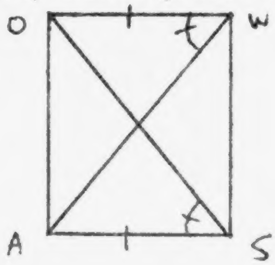


The two triangles XYZ and OPZ can be proved congruent by 2534



- a. ASA only
- b. SAS only
- c. SSS only
- d. ASA and SAS
- e. SSS and SAS
- *f. Cannot be proved congruent

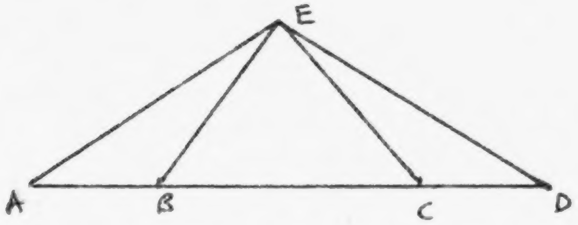
The two triangles AOW and OSA (with $\overline{WA} \cong OS$) can be proved congruent by 2535



- a. ASA only
- b. SAS only
- c. SSS only
- d. ASA and SAS
- *e. SSS and SAS
- f. Cannot be proved congruent

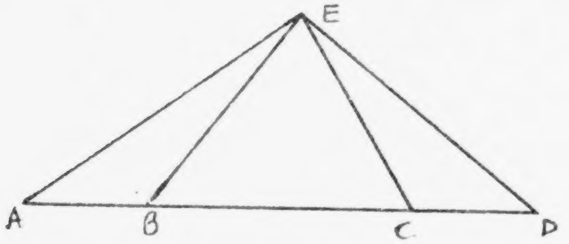
THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THE THEOREMS CONCERNING ISOSCELES TRIANGLES BY FINDING THE RELATIONSHIPS BETWEEN ANGLES WHEN GIVEN TWO CONGRUENT SIDES IN A TRIANGLE. 0665

If segment AE is congruent to segment EC, which of the following statements are true? 2554



- a. $m\angle AEC > m\angle ACE$
- b. $\angle A \cong \angle D$
- *c. $\angle A \cong \angle ECB$
- d. $\angle EBC \cong \angle D$
- e. none of the above

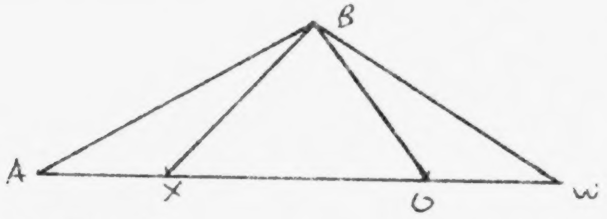
If segment BD is congruent to ED, which of the following statements are true? 2555



a. $\angle EBD \cong \angle D$
*b. $\angle EBD \cong \angle BED$
c. $\angle EBD \cong \angle ECB$
d. $m\angle A > m\angle D$
e. none of the above

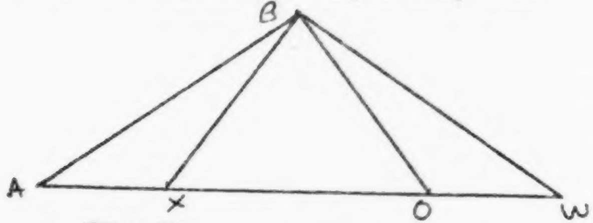
THE STUDENT CAN DEMONSTRATE HIS KNOWLEDGE OF ISOSCELES TRIANGLE THEOREMS BY DETERMINING WHICH SIDES ARE CONGRUENT IF HE IS GIVEN ONE SET OF CONGRUENT ANGLES. 0666

If $\angle BXW$ is congruent to $\angle W$, then: 2556



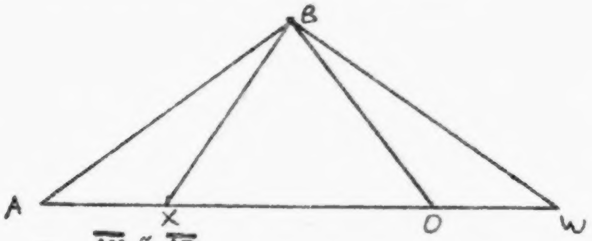
*a. $\overline{BX} \cong \overline{BW}$
b. $\overline{BW} \cong \overline{XW}$
c. $\overline{AX} \cong \overline{BX}$
d. $\overline{XO} \cong \overline{BO}$
e. none of the above

If ∠ XBO is congruent to angle BXO, then: 2557



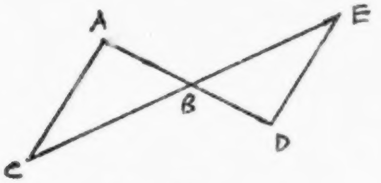
a. $\overline{AO} \cong \overline{BO}$
*b. $\overline{XO} \cong \overline{BO}$
c. $\overline{BX} \cong \overline{AB}$
d. $\overline{BO} \cong \overline{BX}$
e. none of the above

If ABO is congruent to angle W then: 2558



a. $\overline{AW} \cong \overline{AB}$
b. $\overline{AO} \cong \overline{BX}$
c. $\overline{AO} \cong \overline{AB}$
d. $\overline{BO} \cong \overline{BW}$
*e. none of the above

THE STUDENT CAN ANALYZE A GEOMETRIC PROOF BY CHOOSING THE SUFFICIENT CONDITIONS WHICH PRODUCE CONGRUENCY IN TRIANGLES. 0703



In the figure, if BC = BE and $\overline{AD}$ and $\overline{CE}$ intersect at B, then △ABC ≅ △DBE if 2693

a. AC = DE
b. ∠A ≅ ∠C
c. ∠C ≅ ∠D
*d. AB = DB

If the median is drawn to the base of an isosceles $\triangle$, the triangles formed are congruent by 2694

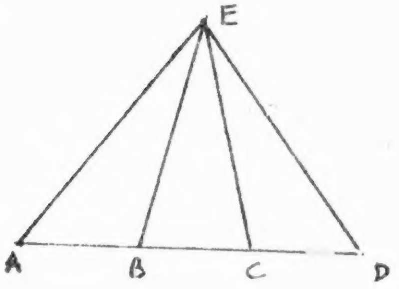
a. the AAA postulate
b. the Pythagorean theorem
*c. the SSS postulate
d. corresponding parts of $\cong$ $\triangle$s are $\cong$

If $\overrightarrow{BD}$ bisects $\angle ABC$ in $\triangle ABC$ then what additional information is needed to prove $\triangle ABD \cong \triangle DCB$? 2695

a. $AC = BC$
b. $\underline{\angle C \cong \angle B}$
*c. $\overline{BD} \perp \overline{AC}$
d. $\angle ABC$ is a right angle

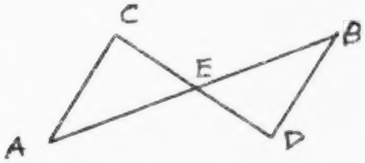
Two isosceles $\triangle$s are $\cong$ if 2696

a. the legs of one $\triangle$ are respectively congruent to the legs of the other $\triangle$.
*b. the base and a base $\angle$ of one $\triangle$ are respectively congruent to the base and a base $\angle$ of the other $\triangle$.
c. the vertex $\angle$s are $\cong$.
d. the base angles are $\cong$



In the figure, if A, B, C, D are collinear, $AE = DE$ and $\angle AEB \cong \angle DEC$, then $\triangle ABE$ can be proved congruent to $\triangle DCE$ by 2697

*a. ASA method
b. AAS method
c. SSS method
d. H.L. method



In the figure, if $\overline{AB}$ and $\overline{CD}$ bisect each other, then $\triangle ACE \cong \triangle BDE$ by 2698

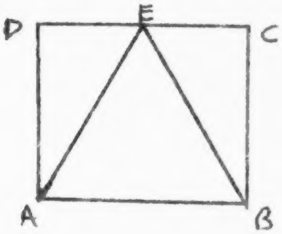
a. the ASA postulate
*b. the SAS postulate
c. the SSS postulate
d. the AAS theorem

If the altitudes are drawn to the legs of an isosceles triangle the triangles that are formed with the base of the isosceles triangle as one side are congruent by 2699

a. the ASA postulate
b. the SAS postulate
c. the hypotenuse - leg theorem
*d. the AAS theorem

If $\overline{AD}$ is a median of $\triangle ABC$, then $\triangle BAD \cong \triangle CAD$ if 2700

a. $\underline{BC} = \underline{BA}$
b. $\overline{BA} \perp \overline{CA}$
*c. $\angle B \cong \angle C$
d. $AD = DC$



In the figure, if ABCD is a square and E is the midpoint of $\overline{DC}$, then $\triangle ADE \cong \triangle BCE$ by 2701

a. ASA
*b. SAS
c. SSS
d. AAA

THE STUDENT CAN RECALL THE NOTATION FOR CORRESPONDING PARTS OF CONGRUENT TRIANGLES BY SELECTING THE CORRECT CORRESPONDENCE. 0704

If $\triangle ABC \cong \triangle DEF$ then 2702

a. $AC = DE$
b. $\angle B \cong \angle F$
*c. $AB = DE$
d. $\angle B \cong \angle E$

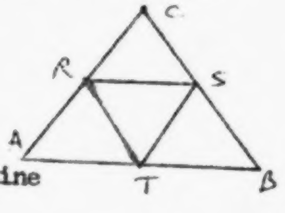
If $\triangle ABC \cong \triangle DEF$ and $\triangle EDF \cong \triangle XYZ$ then 2703

a. $\angle A \cong \angle X$
b. $AC = XY$
c. $\triangle ABC \cong \triangle XYZ$
*d. $\angle C \cong \angle Z$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THE THEOREM ABOUT CONNECTING TWO MIDPOINTS OF ANY SIDE IN A TRIANGLE OR CONNECTING THE MIDPOINTS OF THE LEGS IN A TRAPEZOID BY COMPUTING THE LENGTHS OF VARIOUS SEGMENTS. 0684

If R,S, and T are midpoints of $\overline{AC}$, $\overline{BC}$ and $\overline{AB}$ respectively, and d(A,B) is 18, then d(R,S) is 2604

*a. 9
b. 12
c. 18
d. 36
e. Not enough information given to determine an exact answer



If R, S and T are midpoints of $\overline{AC}$, $\overline{BC}$ and $\overline{AB}$ respectively, and d(A,C) is 30 and d(R,T) is 21 then d(C,B) is 2605

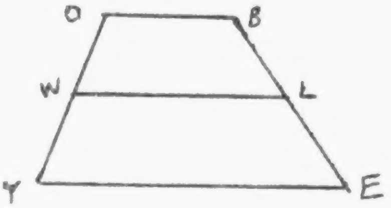
a. $10\frac{1}{2}$
b. 15
*c. 42
d. 60
e. Not enough information given to determine an exact answer

If R,S and T are Midpoints of $\overline{AC}$, $\overline{BC}$ and $\overline{AB}$ respectively, and the perimeter of triangle ABC is 108, then the perimeter of triangle RST is 2606

a. $13\frac{1}{2}$
b. 18
c. 36
*d. 54
e. None of the above

In trapezoid OBEY, points W and L are midpoints of $\overline{OY}$ and $\overline{BE}$ respectively. If d(O,B) is 10 and d(Y,E) is 30 then d(W,L) is 2607

a. 5
b. 15
*c. 20
d. 40
e. none of the above



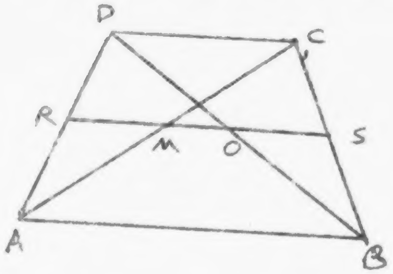
In trapezoid OBEY, points W and L are midpoints of $\overline{OY}$ and $\overline{BE}$ respectively. If d(O,B) is 7 and d(W,L) is 10 then d(Y,E) is 2608

a. 3
b. 14
c. 17
d. 34
*e. None of the above

In trapezoid OBEY, points W and L are midpoints of $\overline{OY}$ and $\overline{BE}$ respectively. If d(O,B) is 10 less than twice d(W,L), then d(Y,E) is 2608A

a. 5
*b. 10
c. 20
d. Not enough information given to find an exact answer

Quadrilateral ABCD is a trapezoid, and R, M, O, S are midpoints
of $\overline{AD}$, $\overline{AC}$, $\overline{DB}$, and $\overline{CB}$ respectively. If d(A,B) is 30 and d(C,D) 2609
is 10, then d(M, O)



a. 5
*b. 10
c. 15
d. 20
e. None of the above

POLYNOMIALS

THE STUDENT CAN ANALYZE AN EXPRESSION TO DETERMINE WHETHER OR NOT IT IS A POLYNOMIAL. 0237

Which of the following is NOT an example of a polynomial? 1196

a. $5x$
b. 0
c. $\frac{1}{3}y^3 - y^2$
*d. none of the above

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE POLYNOMIALS OF A TYPE DIFFERENT FROM THE FIVE BASIC FORMS BY SELECTING THE CORRECT FACTORS. 0303

$x^2 - 2xy + y^2 - 9 =$ 0470

a. $(x - y + 3)(x + y - 3)$
b. $(x - y - 3)(x + y - 3)$
*c. $(x - y + 3)(x - y - 3)$
d. $(x - y - 3)(x - y - 3)$

$4a^2 - 20a + 25 - b^2 + 8b - 16 =$ 0471

a. $(2a - b - 9)(2a + b - 9)$
b. $(2a - b + 9)(2a + b - 9)$
c. $(2a - b + 1)(2a + b - 9)$
*d. $(2a - b - 1)(2a + b - 9)$

$4x^3 - 12x^2 - x + 3 =$ 0472

a. $(x - 3)(2x^2 - 1)$
*b. $(x - 3)(2x + 1)(2x - 1)$
c. $(2x + 1)(x + 3)(2x -1)$
d. $(x - 3)(4x^2 - 1)$

THE STUDENT WILL DEMONSTRATE KNOWLEDGE OF ALGEBRAIC TERMS BY SELECTING THE DEFINITIONS OF MONOMIAL, POLYNOMIAL, DEGREE OF A MONOMIAL IN A VARIABLE, DEGREE OF A MONOMIAL AND THE DEGREE OF A POLYNOMIAL FROM A LIST OF POSSIBILITIES. 0033

A monomial is 0001

*a. a term which is the product of a number and one or more variables, or just a numeral or a variable.
b. a polynomial made up of three or more terms, each term being a monomial.
c. the number of times that the variable occurs as a factor in the polynomial.
d. a term made up of two or more polynomial terms.

A polynomial is 0002

a. the number of times that the variable occurs as a factor in the monomial.
b. the sum of the degrees in each of its variables.
*c. a monomial or the indicated sum of monomials.
d. is monomial consisting of three terms.

The degree of a monomial in a variable is the 0003

a. same as the greatest of the degrees of its terms.
*b. number of times the variable occurs as a factor.
c. sum of the degrees of each of its variables.
d. highest degree of any variable contained in the monomial.

The degree of a monomial is the 0004

*a. sum of the degrees in each of its variables.
b. highest degree of any variable contained in the monomial.
c. number of times that the variable occurs as afactor.
d. sum of the coefficients of the monomial.

The degree of a polynomial is the 0005

a. highest degree of a variable contained in the polynomial.
b. sum of the degrees in each variable contained in the polynomial.
c. number of times the variable occurs as a factor in the polynomial.
*d. greatest of the degrees of its terms.

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF DEGREE BY SELECTING THE DEGREE OF A GIVEN POLYNOMIAL EXPRESSION. 0034

The degree of $15x^4 - 7x^3y^2 + 2xy$ is 0006

a. 4
b. 6
c. 11
*d. 5

The degree of $3x^2y^5$ is 0007

a. 2
b. 8
c. 5
*d. 7

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF POLYNOMIALS AND THEIR DEGREES BY CORRECTLY IDENTIFYING THEM. 0628

How many monomials are there in the polynomial $3x^2y + 4xy + 7xy^2$? 2241

a. 0
b. 1
c. 2
*d. 3
e. 4

A polynomial of three terms is called a 2242

a. monomial
b. binomial
*c. trinomial
d. polynomial

A polynomial of two terms is called a 2243

a. monomial
*b. binomial
c. trinomial
d. polynomial

The degree of the polynomial $3x^3 - 4x^2 + 5x^4$ is 2244

a. 0
b. 1
c. 2
d. 3
*e. 4

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF ALGEBRAIC OPERATIONS BY IDENTIFYING THE ELEMENTS OF AN ALGEBRAIC EXPRESSION WHEN GIVEN NUMERICAL VALUES FOR THE VARIABLES. 0317

If given the expression $6m + 1$, find the value if $m = -2$ 0828

a. 13
*b. -11
c. 11
d. -13
e. none of the above

If given the expression $4\ x^2y$, find the value if $x = 2$, $y = 3$. 0829

a. 24
b. 192
c. 64
d. 12
*e. none of the above

If given the expression $4\ s^2p^3$, find the value if $s = -2$, $p = -1$. 0830

a. 16
b. 48
c. -48
*d. -16
e. none of the above

If given the expression $2\ c^2d$, find the value if $c = .5$, $d = 3$. 0831

*a. 1.5
b. .15
c. 15.0
d. 150
e. none of the above

If given the expression $\frac{1}{4}\ x^2y^2$, find the value if $x = \frac{1}{2}$, $y = -4$. 0832

*a. 1
b. $\frac{1}{2}$
c. -1
d. $-\frac{1}{2}$
e. none of the above

If given the expression $62\ x^3y^8$, find the value if $x = 5$, $y = 0$ 0833

a. 930
b. 7750
c. 1000
d. 80
*e. none of the above

If given the expression $4x^2 - 2x$, find the value if $x = -2$. 0834

a. -12
b. 12
c. -20
*d. 20
e. none of the above

If given the expression $a^2 + ab + \frac{6}{2}$, find the value if $a = -2$, $b = 4$. 0835

*a. -1
b. -10
c. 2
d. 6
e. none of the above

If given the expression $\frac{2x^2y^3z}{5}$, find the value if $x = 2$, $y = -5$, $z = -3$. 0836

a. 72
*b. 600
c. -600
d. -72
e. none of the above

If given the expression $\frac{3ab^5c^4d^2}{4ab^3c}$, find the value if $a = 2$, $b = 4$, $c = -1$, $d = 5$. 0837

a. -60
b. 60
c. 300
d. -360
*e. none of the above

THE STUDENT CAN ANALYZE A POLYNOMIAL EXPRESSION BY INDICATING INTEGRAL VALUES OF A COEFFICIENT WHICH FACTOR A BINOMIAL SUM. 0048

Given the polynomial expression $x^2 + bx - 12$ the integral values of b for which the trinomial can be factored are: 0065

a. $\{1, -12, 2, -6, 3, -4\} = b$
*b. $\{-11, -4, -1, 11, 4, 1\} = b$
c. $\{3, 2, 4, 1, 0, 6\} = b$
d. $\{3, 2, 4, -1, 0, -6\} = b$

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF ADDITION AND SUBTRACTION OF POLYNOMIALS BY SELECTING THE RESULT OF A GIVEN OPERATION. 0035

Add $\begin{array}{r} 3x + 1 \\ \underline{x + 2} \end{array} =$ 0008

a. $5x + 2$
*b. $4x + 3$
c. $2x + 3$
d. $2x + 5$

Add $\begin{array}{l} 3b^3 + 4d \\ \underline{2c^2 + 3d} \end{array} =$ 0009

a. $5b^3c^2 + 7d$
b. $5b^5c^5 + 7d$
*c. $2c^2 + 3b^3 + 7d$
d. $6db^3 + 6c^2d$

Sub. $\begin{array}{l} 3b^2 + b - 1 \\ \underline{2b^2 + 6b + 5} \end{array} =$ 0010

*a. $b^2 - 5b = 6$
b. $b^2 + 5b - 6$
c. $b^2 - 5b + 6$
d. $b^2 + 5b + 6$

0011

$2x^2 + 2x + 7$
Sub. $\underline{x^2 + 3x - 8}$
=

a. $x^2 + x - 1$
b. $x^2 - x + 1$
c. $x^2 + x + 15$
*d. $x^2 - x + 15$

0627

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE METHOD FOR ADDITION AND SUBTRACTION OF POLYNOMIALS BY FINDING THE CORRECT SUMS AND DIFFERENCES.

2235

Add $5x + 3$
$\underline{2x - 4}$

a. $3x - 1$
b. $7x + 7$
*c. $7x - 1$
d. $3x - 7$

2236

Find $(6R - 5) - (3R + 2)$

a. $9R - 7$
b. $3R - 7$
c. $9R - 3$
*d. $3R - 7$

2237

$(3x^2 - 2x + 7) + (-5x^2 + 6x - 8) =$

a. $8x^2 + 8x + 15$
b. $-8x^2 - 8x - 15$
*c. $-2x^2 + 4x - 1$
d. $-2x^2 - 8x - 1$
e. $-2x^2 - 4x + 1$

$(4z^2 - 5z - 3) - (2z^2 - 7z - 3) =$ 2238

a. $2z^2 - 12z - 6$
b. $2z^2 - 2z$
*c. $2z^2 + 2z$
d. $2z^2 + 2z - 6$

$(x^2 + y^2 - z^2) + (3z^2 - 2x^2 - 4y^2) + (4y^2 + x^2 + z^2)$ 2239

a. $4x^6 + 9y^6 + 5z^6$
b. $x^2 - 7y^2 + 3z^2$
c. $x^4 - 16y^4 + 3z^4$
*d. $y^2 + 3z^2$
e. $x^2 + y^2 + z^2$

The perimeter, in feet, of an isosceles triangle playground is $7x - 2y$. The length of the two congruent sides, in feet, is $x + 2y$. Write an expression for the length of the base in feet. 2240

*a. $5 x - 6y$
b. $5x$
c. $5x - 4y$
d. $9x + 2y$

THE STUDENT, GIVEN TWO OR MORE POLYNOMIAL EXPRESSIONS, WILL BE ABLE TO SELECT THE PRODUCT — DEMONSTRATING THAT HE CAN APPLY HIS KNOWLEDGE OF MULTIPLICATION. 0037

$x^3 (x - 7) =$ __________ 0018

a. $x^4 + 7x^3$
b. $x^2 - 7x^3$
c. $x^4 - 7$
*d. $x^4 - 7x^3$

0019

$-y^2 (7 - 3y - y^3) =$ ________

*a. $-7y^2 + 3y^3 + y^5$
b. $7y^2 - 3y^3 - y^5$
c. $-7y^2 - 3y^3 + y^5$
d. $7y^2 + 3y^3 - y^5$

0020

$(m - 5) (m - 5) =$ ________

a. $m^2 + 25$
b. $m^2 - 25$
*c. $m^2 - 10m + 25$
d. $m^2 + 10m - 25$

0021

$(3x^2 - x + 2)(x^2 + 2x + 1) =$ ______

*a. $3x^4 + 5x^3 + 3x^2 + 3x + 2$
b. $3x^2 - 5x - 5x^2 + 2$
c. $-3x^2 + 5x + 5x^2 + 2$
d. $3x^4 - 5x^3 - 3x^2 + 3 + 2$

0022

Given (x-7) as a divisor and x-8 as a quotient, which of the items below would be the resulting dividend?

a. $x^2 - 15x - 56$
*b. $x^2 - 15x + 56$
c. $x^2 + 56$
d. $x^2 - 56$

0023

$(a + 1)(a + 1) =$

a. $a^2 + 1$
b. $a^2 + a + 1$
c. $a^2 + 2a$
*d. $a^2 + 2a + 1$

THE STUDENT DEMONSTRATES HIS ABILITY TO MULTIPLY THE SUMS AND DIFFERENCES OF TWO POLYNOMIAL EXPRESSIONS BY SELECTING THE CORRECT RESULT OF A GIVEN PRODUCT. 0042

The product of $(3a + B)(3a - b)$ is 0043

a. $9a^2 + b^2$
*b. $9a^2 - b^2$
c. $9a - b$
d. $9a + b$

The product of $(x + 1)$ and $(x - 1)$ is 0044

a. $x^2 + 2x - 1$
b. $x^2 + 1$
*c. $x^2 - 1$
d. $x^2 - 2x + 1$

$(2x + 3)$ and $(2x - 3)$ is 0045

*a. $4x^2 - 9$
b. $4x^2 + 9$
c. $4x^2 - 12x + 9$
d. $4x + 9$

THE STUDENT SHOWS HIS UNDERSTANDING OF THE PRODUCT OF A BINOMIAL SQUARE BY SELECTING THE CORRECT PRODUCT FOR A GIVEN SQUARE. 0044

The product of $(m + h)^2$ is 0049

a. $m^2 + h^2$
b. $m^2 + 2h + h^2$
c. $m^2 + 2m + h^2$
*d. $m^2 + 2mh + h^2$

The product of $(5x + b)^2$ is 0050

- *a. $25x^2 + 10xb + b^2$
- b. $25x^2 + 10x + b^2$
- c. $25x^2 + 10b + b^2$
- d. $25x^2 + 10x^2b^2 + b^2$

The product of $(3a - b)^2$ is 0051

- a. $9a^2 + 6ab + b^2$
- *b. $9a^2 - 6ab + b^2$
- c. $9a^2 + 6a^2b^2 + b^2$
- d. $9a^2 - 6a^2b^2 + b^2$

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF MULTIPLICATION OF TWO POLYNOMIAL EXPRESSIONS BY SELECTING THE CORRECT PRODUCT FOR EACH PAIR GIVEN. 0045

The product of $(4a + 3)(3a + 4)$ is 0052

- *a. $12a^2 + 25a + 12$
- b. $12a^2 + 12$
- c. $12a + 25a^2 + 12$
- d. $12 + 12a^2 + 25a^2$

The product of $(3 - 2y)(y - 8)$ is 0053

- a. $2y^2 - 19y + 24$
- b. $-2y^2 + 13y - 24$
- *c. $-2y^2 + 19y - 24$
- d. $2y^2 - 13y - 24$

What is the product of $(x + 6)$ and $(5 - x)$ 0054

a. $x^2 + x + 30$
*b. $30 - x - x^2$
c. $x^2 - 11x + 30$
d. $30 + x + x^2$

THE STUDENT DEMONSTRATES HIS ABILITY TO MULTIPLY POLYNOMIALS WHEN HE CHOOSES THE CORRECT PRODUCT. 0239

The product of $(3x + 2)(5x^2 - x + 2)$ is 1200

*a. $15x^3 + 7x^2 + 4x + 4$
b. $15x^3 + 7x^2 + 8x + 4$
c. $17x^3 - x + 8x$
d. $15x^3 - 3x^2 + 4$

The product of $(2x + 3)(x - 1)(5)$ is 1201

a. $2x^2 - 3$
b. $2x^2 + x - 3$
c. $10x^2 - 15$
*d. $10x^2 + 5x - 15$

The product of $(3x - 1)(x - 2)(0)$ is 1202

a. $3x^2 - 5x - 2$
b. $3x^2 - 2$
c. $3x^2 - 6x - 2$
*d. none of these

The product of $(x + a)(x + b)$ is 1203

a. $x^2 + ab$
*b. $x^2 + ax + bx + ab$
c. $x^2 + abx + ab$
d. none of these

GIVEN THE INDICATED DIVISION OF TWO POLYNOMIALS, THE STUDENT IS ABLE TO SELECT THE QUOTIENT FROM A GROUP OF FOUR OR FIVE POSSIBILITIES — DEMONSTRATING HIS ABILITY TO APPLY POLYNOMIAL DIVISION. 0038

$\frac{15y^4 - 5y^2}{5y} =$ ________ 0024

a. $3y^5 - y^3$
b. $3y^5 - 5y^3$
*c. $3y^3 - y$
d. $3y^3 - 5y$

$5x^4 - 15x^3 + 45x^2 - 10x \div 5x =$ ________ 0025

*a. $x^3 - 3x^2 + 9x - 2$
b. $x^3 - 15x^3 + 45x^2 - 2x$
c. $x^3 + 3x^2 + 9x + 2$
d. $x^3 + 15x^4 - 45x^2 + 2x$

$\frac{x^2 + 11x + 28}{x + 7} =$ ________ 0026

a. $x - 4$
b. $x + 17$
c. $x - 17$
*d. $x + 4$

$\frac{3x^3 + 11x^2 + 11x + 15}{x + 3} =$ ______________

a. $x^2 + 2x + 5$
b. $3x^2 + 2x$
c. $x^2 - 2x + 5$
*d. $3x^2 + 2x + 5$

THE STUDENT DEMONSTRATES HIS ABILITY TO DIVIDE A POLYNOMIAL BY ANOTHER POLYNOMIAL WHEN HE CHOOSES THE CORRECT QUOTIENT. 0242

The quotient of $\frac{16x^4 - \frac{1}{4}x^3 - \frac{1}{3}x^2}{\frac{1}{2}x^2}$ is 1213

a. $8x^2 - \frac{1}{8}x - \frac{1}{6}$
b. $32x^6 - \frac{1}{2}x^5 - \frac{2}{3}x^4$
c. $32x^2 - \frac{1}{4}x^3 - \frac{1}{3}x^2$
d. $8x^2 - \frac{1}{4}x^3 - \frac{1}{3}x^2$

e. none of these

The quotient of $-(\frac{-15x^4}{3x^3})$

a. $-3x$
b. $-5x$
c. $5x^7$
*d. $5x$
e. none of these

The remainder when $8x^3 - 2x^2 + 10$ is divided by $2x + 1$ is 1215

a. -12
b. 10
*c. $8\frac{1}{2}$
d. 0
e. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THE REMAINDER AND FACTOR THEOREM TO EXPRESSIONS BY DETERMINING VALUES IN THE QUOTIENT AND REMAINDER. 0537

The value of h so that $q + 3$ is a factor of $q^2 + hq + 12$ is 1965

- a. -7
- *b. 7
- c. 4
- d. -4
- e. 21

The values of a and b so that $\frac{x^2 - 7x + b}{x + a} = x - 2 + \frac{5}{x + a}$ for $x \neq -a$ are 1966

- *a. $a = -5$ and $b = 15$
- b. $a = -5$ and $b = -15$
- c. $a = 5$ and $b = 15$
- d. $a = 5$ and $b = -15$

THE STUDENT CAN APPLY THE DISTRIBUTIVE PROPERTY IN MULTIPLICATION AND DIVISION OF POLYNOMIALS BY MONOMIALS BY CHOOSING THE CORRECT EXPRESSION FOR A GIVEN PRODUCT OR QUOTIENT. 0524

If $-4x$ is a factor of $8x^3 - 24x^2 + 32x$; then the other factor is 0888

- a. $-2x^2 - 6x - 8$
- b. $2x^2 + 6x + 8$
- c. $2x^2 - 6x + 8$
- *d. $-2x^2 + 6x - 8$

If a rectangle has the base $3m - 9$ and an altitude $-2h$, then the area may be represented by the binomial 0889

*a. $-6hm + 18h$
b. $-2h(3m - 9)$
c. $6hm - 18h$
d. $-6hm - 18h$

Change the improper fraction $\frac{6x^2 + 9 - 8x}{2x}$ to a mixed expression 0890

a. $3x + 4\frac{1}{2}x + 4$
b. $3x + 9 - 8x$
*c. $3x - 4 + \frac{9}{2x}$
d. $6x^2 + 9 - 4$

Change the improper fraction $\frac{4x - 11}{-4x}$ to a mixed expression 0891

a. $1 + \frac{11}{4x}$
*b. $-1 + \frac{11}{4x}$
c. $\frac{11}{4x}$
d. $-\frac{11}{4x}$

Change the sign of the denominator of the fraction $\frac{x + a}{a - x}$ 0892

a. $\frac{x + a}{-a - x}$
b. $\frac{-x + a}{x + a}$
c. $\frac{-x - a}{x + a}$
*d. $\frac{-x - a}{x - a}$

If $-2x$ is a factor of $-6x^2 - 2x$ then the other factor is 0893

*a. $3x + 1$
b. $3x - 1$
c. $3x$
d. $-3x$

The length of a rectangle is $5x^2 + 6x + 9$ and the width is $-2x$. Express the area using the distributive property. 0894

a. $(5x^2 + 6x + 9)(-2x)$
*b. $-10x^3 - 12x^2 - 18x$
c. $-2x(5x^2 + 6x + 9)$
d. all correct

The side of a square is $7x^2 - 9x + 11$. Express the perimeter of the square to illustrate the use of the distributive property. 0895

a. $4(7x^2 - 9x + 11)$
b. $2(7x^2 - 9x + 11) + 2(7x^2 - 9x + 11)$
c. $3(7x^2 - 9x + 11) + 1(7x^2 - 9x + 11)$
*d. all of the above
e. none of the above

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE A POLYNOMIAL EQUATION BY THE FACTORING METHOD BY CHOOSING THE CORRECT SOLUTION SET FOR EACH EQUATION. 0050

The solution set of $(x - 3)(x - 5) = 0$ is: 0069

a. $x = \{-3, -5\}$
*b. $x = \{3, 5\}$
c. $x = \{3, -5\}$
d. $x = \{-3, 5\}$

The solution set of $(6r + 3)(7r + 14) = 0$ is: 0070

a. $r = \{2, \frac{1}{2}\}$
b. $r = \{-\frac{1}{2}, 2\}$
c. $r = \{\frac{1}{2}, -2\}$
*d. $r = \{-\frac{1}{2}, -2\}$

The solution set of $w^2 + w - 90 = 0$ is: 0071

*a. $w = \{-10, 9\}$
b. $w = \{10, -9\}$
c. $w = \{-9, -10\}$
d. $w = \{9, 10\}$

$n^3 - 6n^2 - 40n = 0$ has as a solution set 0072

*a. $n = \{0, 10, -4\}$
b. $n = \{10, -4\}$
c. $n = \{10, 4\}$
d. $n = \{0, -10, 4\}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY FACTORING TECHNIQUES OF POLYNOMIALS BY FINDING SOLUTION SETS OF POLYNOMIAL EQUATIONS. 0535

The solution set of $x^5 - 10x^3 + 9x = 0$ is 1958

a. $\{0, 1, 3\}$
b. $\{0, -1, -3\}$
c. $\{-3, -1, 1, 3\}$
d. $\{3, 1\}$
*e. $\{-3, -1, 0, 1, 3\}$

The solution set of x for $(x^2 - x - 2)^2 - 14(x^2 - x - 2) + 40 = 0$ 1959

a. $\{10, 4\}$
*b. $\{4, 3, -3, -2\}$
c. $\{-10, -4\}$
d. $\{-4, -3, 3, -2\}$
e. $\{10, 4, -10, -4\}$

The solution set for x is $\frac{4}{x^2} - x^2 = 0$ 1960

a. $\sqrt{3},\ -\sqrt{2}$

b. $0,\ \sqrt{2},\ -\sqrt{2}$

*c. $\sqrt{2},\ -\sqrt{2},\ i\sqrt{2},\ -i\sqrt{2}$

d. $\sqrt{2},\ -\sqrt{2},\ \sqrt{2i}\ \ -\sqrt{2i}$

The solution set for x in $\frac{7}{x-1} - \frac{6}{x^2-1} = 5$ is 1961

a. $\{-2,\ 3/5\}$

*b. $\{2,\ -3/5\}$

c. $\{2,\ -2\}$

d. $\{1,\ 2,\ -3/5\}$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THEOREMS ON ZEROS OF A POLYNOMIAL BY FINDING THE ZEROS OF PARTICULAR POLYNOMIALS. 0541

If 2 is a zero of the polynomial $x^3 + a\,x + b$, then the quadratic equation that the other two roots must satisfy is 1980

a. $x^2 - 2x + 4 + a = 0$

*b. $x^2 + 2x + 4 + a$

c. $x^2 + 2x + a$

d. $x^2 - 2x - a$

The zeros of the polynomial $x^2 + bx + c$ are $-c \pm \sqrt{bc}$. The values of b and c if $c \neq 0$ are 1981

a. $b=2$ and $c=1$
b. $b={}^{-}2$ and $c=1$
*c. $b = -2$ and $c = -1$
d. $b = 2$ and $c = -1$

The solution set for the equation $4^{3x} - 2^{3x + 1} + 1 = 0$ is 1982

a. $\left\{\frac{1}{3}\right\}$
b. $\left\{\frac{1}{6}\right\}$
*c. $\{0\}$
d. $\{\emptyset\}$

THE STUDENTS WILL BE ABLE TO IDENTIFY THE GREATEST COMMON FACTOR IN A GROUP OF POLYNOMIALS BY CHOOSING THE GCF FOR A GIVEN POLYNOMIAL. 0195

The greatest common factor in $13x^2 - 26xy^2 + 65y^3$ is: 0698

a. 2
*b. 13
c. x
d. y^2
e. none of the above

The greatest common factor in $9x^3 + 15x^2 - 27x^4$ is: 0699

a. 3
b. 9
c. x
d. $3x$
*e. none of the above

The greatest common factor in $12(x + y) + 3(x + y)$ is 0700

a. 1
b. 3
c. $(x + y)$
*d. $3(x + y)$
e. none of the above

The greatest common factor in $84x^5 - 24x^6 + 60x^{10}$ is 0701

a. 1
b. x^{10}
c. $2x^{10}$
d. $12x^{10}$
*e. none of the above

The greatest common factor in $(x - 8y)^3 + 5(x - 8y) + 3x^2(x - 8y)^4$ is 0702

a. 1
b. 5
*c. $(x - 8y)$
d. $(x - 8y)^4$
e. none of the above

THE STUDENT DEMONSTRATES HIS ABILITY TO DETERMINE THE GREATEST COMMON DIVISOR AND THE LEAST COMMON MULTIPLE FOR TWO OR MORE NUMBERS WHEN HE CHOOSES THE LCD OR LCM FOR A GIVEN SET OF NUMBERS. 0236

The lowest common multiple for $\{4, 12 \text{ and } 30\}$ is ... 1192

a. 2
*b. 60
c. 1440
d. none of the above

The greatest common divisor for $\{10, 15, 21\}$ is ... 1193

a. 3
b. 5
c. 210
*d. none of the above

The lowest common multiple for $\{x^2y, xy^2, xy\}$ is ... 1194

a. x^3y^3
*b. x^2y^2
c. xy
d. none of the above

The greatest common divisor for $\{x^2y, xy^2, xy\}$ is ... 1195

a. x^3y^3
b. x^2y
*c. xy
d. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO ANALYZE SOME GIVEN INFORMATION ON POWERS OF A TRINOMIAL BY IDENTIFYING PROPERTIES OF THE TRINOMIAL EXPANSION. 0532

Directions: Study each of these identities. After you have the characteristics common to them, answer each of the following questions.

$$(a + b + c)^2 = a^2 + 2ab + 2ac + b^2 + 2bc + c^2$$

$$(a + b + c)^3 = a^3 + 3a^2b + 3a^2c + 3ab^2 + 6abc + 3ac^2 + b^3 + 3b^2c + 3bc^2 + c^3$$

$$(a + b + c)^4 = a^4 + 4a^3b + 4a^3c + 6a^2b^2 + 12a^2bc + 6a^2c^2 + 4ab^3 + 12ab^2c + 12abc^2 + 4ac^3 + b^4 + 4b^3c + 6b^2c^2 + 4bc^3 + c^4$$

The right hand member of the equation of $(a + b + c)^8$ will contain: 1950

a. 9 terms
b. 16 terms
c. 90 terms
*d. 45 terms
e. 36 terms

The number of different terms involving a^5 in the right hand member of $(a + b + c)^8$ is: 1951

a. 2
*b. 4
c. 3
d. 5

The numerical coefficient of a^5b^2c in the right hand member of $(a + b + c)^8$ 1952

a. 56
b. 14
*c. 168
d. 42
e. 1008

THE STUDENT WILL DEVELOP A THEOREM FOR THE EXPANSION OF A TRINOMIAL AS EVIDENCED BY HIS INDICATING THE PROPERTIES OF A GENERAL TRINOMIAL EXPANSION. 0533

Directions: Study each of these identities. After you have the characteristics common to them, answer the following questions.

$$(a + b + c)^2 = a^2 + 2ab + 2ac + b^2 + 2bc + c^2$$

$$(a + b + c)^3 = a^3 + 3a^2b + 3a^2c + 3ab^2 + 6abc + 3ac^2 + b^3 + 3b^2c + 3bc^2 + c^3$$

$$(a + b + c)^4 = a^4 + 4a^3b + 4a^3c + 6a^2b^2 + 12a^2bc + 6a^2c^2 + 4ab^3 + 12ab^2c + 12abc^2 + 4ac^3 + b^4 + 4b^3c + 6b^2c^2 + 4bc^3 + c^4$$

The right hand member of the equation $(a + b + c)^n$ will contain 1953

a. $2n$ terms
b. $n + 1$ terms
c. $\frac{n(n+1)}{2}$ terms
*d. $\frac{(n+1)(n+2)}{2}$ terms
e. $n(n + 1)$ terms

The number of different terms involving a^{n-r} in the right hand member of $(a + b + c)^n$ is 1954

a. r
b. $r - 1$
*c. $r + 1$
d. $r!$
e. n

The numerical coefficient of $a^{n - r} b^{r - 3} c^{3}$ in the expansion of $(a + b + c)^{n}$ is 1955

a. $\frac{n(n - 1)(n - 2)\ldots(n - r + 1)}{r!}$

*b. $\frac{n(n - 1)(n - 2)\ldots(n - r + 1}{3!\,(r - 3)!}$

c. $\frac{n(n - 1)(n - 2)\ldots(n - r)}{(r + 1)!}$

d. $\frac{n(n - 1)(n \;\; 2)\ldots\ldots.(n - r)}{3(r - 3)!}$

e. $\frac{n(n - 1)(n-2)\ldots(n - r + 1)}{3!r!}$

THE STUDENT WILL ANALYZE EXAMPLES OF A TRINOMIAL SQUARE BY CHOOSING CORRECT CHARACTERISTICS OF A TRINOMIAL SQUARE. 0176

Directions: The following trinomials are examples of a trinomial square.

$x^{2} + 6x + 9$

$y^{2} - 14y + 49$

$z^{2} + 1z + \frac{1}{4}$

One will note that the following information is true about these trinomials. 0580

a. The last term is always an odd number.
b. The middle term is 2 times the square root of the last term.
c. The first and last term are perfect squares.
d. All of the above
e. a and c
*f. b and c

THE STUDENT WILL BE ABLE TO RECOGNIZE A TRINOMIAL SQUARE BY CHOOSING THE CORRECT REPRESENTATION. 0177

Which of the following trinomials is not a trinomial square? 0581

a. $a^2 + 12a + 36$
b. $z^2 - 16a + 64a^2$
c. $q^2 + \frac{1}{2}q + \frac{1}{16}$
*d. $x^2 + 5x + 25$

THE STUDENT DISPLAYS HIS ABILITY TO EXPAND ANY BINOMIAL EXPRESSION USING THE BINOMIAL THEOREM BY CHOOSING THE CORRECT EXPANSION FOR A GIVEN EXPRESSION. 0151

Expand $(x + y)^7$, expressing the result in simplest form. 0422

*a. $x^7 + 7x^6y + 21x^5y^2 + 35x^4y^3 + 35x^3y^4 + 21x^2y^5 + 7xy^6 + y^7$
b. $x^7 + 7x^6y + 20x^5y^2 + 30x^4y^3 + 40x^3y^4 + 21x^2y^5 + 7xy^6 + y^7$
c. $x^7 + 7x^6y + 15x^5y^2 + 19x^4y^3 + 21x^2y^5 + 25x^3y^4 + 7xy^6 + y^7$
d. $x^7 + 7x^6y + 21x^5y^2 + 30x^4y^3 + 21x^2y^5 + 30x^5y^4 + 19xy^6 + y^7$

Find the fourth term of $(x^2 + 3)^6$ 0423

a. $270x^6$
b. $540x^2$
c. $180x^4$
*d. $540x^6$

Find the middle term of $(2 - x^2)^{10}$ 0424

a. $7126x^5$
b. $6723x^{10}$
*c. $-8064x^{10}$
d. $-7126x^5$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO SYNTHESIZE THE BINOMIAL THEOREM BY SEEING SPECIAL FEATURES OF THE COEFFICIENTS WHEN HE CHOOSES CORRECT COEFFICIENTS. 0314

Instructions: The following items are a set leading to the development of a general formula from examples of specifics.

By using the distributive law the expansion of

$(a + b)^2 = a^2 + 2\ ab + b^2$ of

$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

and of $(a + b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

What conclusion can be drawn about the powers of a and b? 0522

a. Both a and b increase in power from beginning to end.
b. a increases as b decreases.
c. Both a and b decrease.
*d. As a decreases, b will increase.
e. None of the above.

From the pattern of the coefficients, what would be the next line or the coefficients of $(a + b)^5$? 0523

1
1 2 1
1 3 3 1
1 4 6 4 1

a. 1 5 10 5 1
b. 1 5 8 8 5 1
c. 1 5 8 5 1
*d. 1 5 10 10 5 1
e. None of the above

Find the term that is missing. 0524

$(a + b)^8 = \ldots + 70\ a^4b^4 + \_\_\_\_\_\_\ a^3b^5 + 28\ a^2b^6 + \ldots$

a. 70
b. 28
c. 54
d. 62
*e. None of these

Fill in the missing term and its sign. 0525

$(x - 3y)^7 = \ldots + 21\ x^5\ (3y)^2$ ____________ $+ 35\ x^3\ (3y)^4 \ldots$

- *a. $-35x^4\ (3y)^3$
- b. $-21x^4\ (3y)^3$
- c. $35\ (x^4).3y^3$
- d. $21(x^4)\cdot 3y^3$
- e. None of those

Which of the following is the correct expansion of $(2x + y)^5$? 0526

- a. $2x^5 + 10x^4y + 20x^3y^2 + 20x^2y^3 + 10xy^4 + y^5$
- *b. $32x^5 + 80x^4y + 80x^3y^2 + 40x^2y^3 + 10xy^4 + y^5$
- c. $32x^5 + 40x^4y + 80x^3y^2 + 40\ x^2y^3 + 10xy^4 + y^5$
- d. $16x^5 + 40\ x^4y + 80x^3y^2 + 40\ x^2y^3 + 16xy^4 + y^5$

What would be the first three terms of the expansion $(a + b)^n$? 0527

- a. $a^n + n\ a^{n-1}\ b + n\ (n-1)\ a^{n-2}\ b^2 + \ldots$
- b. $a^n + n\ a^{n-1}\ b + \frac{(n-1)}{2} \cdot a^{n-2}\ b^2 + \ldots$
- *c. $a^n + \frac{n}{1} \cdot a^{n-1}\ b + \frac{n\ (n-1)}{1\ .\ 2} \cdot a^{n-2}\ b^2 + \ldots$
- d. $a^n + \frac{n}{1}\ a^{n-1}\ b + \frac{n(n+1)}{2}\ a^2b^2 + \ldots$

PRIMES AND FACTORS

THE STUDENT CAN DIFFERENTIATE BETWEEN PRIME AND COMPOSITE NUMBERS BY CHOOSING ONE OR THE OTHER FROM A GIVEN LIST. 0019

Which of the following is a composite number? 1445

*a. 91
b. 83
c. 73
d. 41

Which of the following is a prime number? 1446

a. 111
b. 87
c. 121
*d. 67

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF THE DEFINITIONS OF "IS DIVISIBLE BY", "IS A FACTOR OF" AND "PROPER FACTOR" AND HOW TO USE THEM PROPERLY IN SENTENCES BY SELECTING A TRUE STATEMENT USING THESE PHRASES. 0021

Which of the following is true? 1449

a. 19 is a proper factor of 19
b. 16 is a factor of 4
c. 56 is divisible by 9
*d. 14 is a factor of 70

The set of proper factors of 18 is 1450

*a. {2, 3, 6, 9}
b. {1, 2, 3}
c. {1, 2, 3, 6, 9, 18}
d. {2, 3, 6, 9, 18}

THE STUDENT DEMONSTRATES HIS ABILITY TO PRIME FACTOR A GIVEN NUMBER BY CHOOSING THE PRIME FACTORIZATION OF A GIVEN NUMBER. 0024

Given:

a. $2\cdot3^2\cdot4$ b. $2^2\cdot3^3$
c. $2^3\ \ 3^3$ d. $2^3\ \ 3^2$

Choose the best answer for the following questions from the given list.

d The prime factorization of 72 is 1457
c The prime factorization of 216 is 1458

THE STUDENTS CAN DEMONSTRATE HIS ABILITY TO COMPREHEND THE PROCEDURE OF PRIME FACTORIZATION TO THE FINDING OF THE FACTORS OF A NUMBER BY BEING ABLE TO SELECT THAT VALUE WHICH IS NOT A FACTOR OF A PARTICULAR NUMBER GIVEN ITS PRIME FACTORIZATION. 0434

Which of the following is not a factor of $x = 2^2\cdot3^3\cdot5^2\cdot7$? 1688

a. 105
b. 420
c. 525
*d. 635
e. 4725

Which of the following is not a factor of $y = 2^2\cdot3\cdot5^3\cdot7^2$? 1689

*a. 253
b. 588
c. 735
d. 875
e. 2625

THE STUDENT CAN EXHIBIT HIS ABILITY TO APPLY THE SIEVE OF ERATOSTHENES TO SELECT FACTS ABOUT THE PROCESS. 0435

Which answer would best approximate the percentage of whole numbers which are prime? 1690

*a. 25%
b. 75%
c. 50%
d. 33 1/3%
e. 66 2/3%

If n is a certain prime then in general the first number that will be sieved out as composite by n is 1691

a. 2 x n
b. $\sqrt{n}$
*c. n x n
d. n + n
e. n^2

THE STUDENT CAN APPLY THE TECHNIQUES OF DETERMINING WHETHER A CERTAIN WHOLE NUMBER IS PRIME OR COMPOSITE AS OBSERVED IN USING THE SIEVE OF ERATOSTHENES BY SELECTING THE LARGEST PRIME ANOTHER PRIME MUST BE TESTED WITH TO ESTABLISH IT AS PRIME. 0436

173 is a prime number. What is the largest prime that 173 must be tested with in order to establish that it is prime? 1692

a. 173
b. 71
*c. 13
d. 17
e. 23

311 is a prime number. What is the largest prime that 311 must be tested with in order to establish that it is prime? 1693

a. 151
b. 61
c. 311
*d. 17
e. 31

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO DETERMINE WHETHER A PARTICULAR WHOLE NUMBER IS PRIME OR COMPOSITE BY SELECTING WHICH OF A GIVEN LIST OF WHOLE NUMBERS IS A PRIME. 0437

Which of the following is a prime number? 1694

a. 217
b. 215
c. 213
*d. 211
e. 209

Which of the following is a prime number? 1695

a. 121
b. 119
c. 117
d. 115
*e. 113

THE STUDENT CAN ANALYZE THE TECHNIQUE OF FINDING THE PRIME FACTORIZATION BY RECOGNIZING WHICH ERROR IN TECHNIQUE IS EVIDENT IN A GIVEN SAMPLE. 0438

Which error in technique is evident in 1696

60012	2
306	2
153	3
51	3
17	17
1	

a. Smallest prime was not used as divisor.
b. The use of a prime as divisor was exhausted, but a further quotient became divisible by this prime. (Indicates a division error).
c. Did not finish with a one in the quotient column. (list of prime factors either too long or too short).
d. All numbers in the divisor column are not prime.
*e. One or more of the quotients is incorrect because not enough or too many zeros were left as place holders when dividing.

Which error in technique is evident in 1697

150	2
75	5
15	5
3	3
1	

*a. Smallest prime was not used as divisor.
b. The use of a prime as divisor was exhausted but a further quotient became divisible by this prime. (Indication of a division error).
c. Did not finish with a one in the quotient column. (list of prime factors either too long or too short).
d. All numbers in the divisor column are not prime.
e. One or more of the quotients is incorrect because not enough or too many zeros were left as place holders when dividing.

Which error in technique is evident in 1698

805	5
171	3
57	3
19	19
1	

a. Smallest prime was not used as divisor.
*b. The use of a prime as divisor was exhausted but a further quotient became divisible by this prime. (Indication of a division error).
c. Did not finish with a one in the quotient column. (List of prime factors either too long or too short).
d. All numbers in the divisor column are not prime.
e. One or more of the quotients is incorrect because not enough or too many zeros were left as place holders when dividing.

Which error in technique is evident in 1699

256	2
128	2
64	2
32	2
16	2
8	2
4	2
2	1

a. Smallest prime was not used as divisor.
b. The use of a prime as divisor was exhausted but a further quotient became divisible by this prime. (Indication of a division error).
*c. Did not finish with a one in the quotient column. (List of prime factors either too long or too short).
d. All numbers in the divisor column are not prime.
e. One of the quotients is incorrect because not enough or too many zeros were left as place holders when dividing.

Which error in technique is evident in 1700

$$\begin{array}{r|l} 429 & 3 \\ 143 & 143 \\ 1 & \end{array}$$

*a. Smallest prime was not used as divisor.
b. The use of a prime as divisor was exhausted but a further quotient became divisible by this prime. (Indication of a division error.
c. Did not finish with a one in the quotient column. (List of prime factors either too long or too short.)
d. All numbers in the divisor column are not prime.
e. One of the quotients is incorrect because not enough or too many zeros were left as place holders when dividing.

THE STUDENT CAN DEMONSTRATE THE ABILITY TO ANALYZE QUESTIONS RELATING TO FACTORS OF A SPECIFIC NUMBER BY DECIDING WHETHER A PARTICULAR ANSWER IS CORRECT OR CONTAINS A PARTICULAR ERROR OF THOSE WHICH ARE LISTED. 0439

A response to the problem "List all the factors of 60" is answered as follows: 1701

$\{1,2,3,4,6,10,15,30,60\}$

Determine if the set is complete or if it contains one of the common errors that are given as alternatives.

a. The set is complete.
b. The set of factors are confused in some way with multiples.
c. The set of factors are confused in some way with terms (addends).
d. Some or all of the improper factors are missing.
*e. Some or all of the proper factors are missing.

A response to the problem "List all the factors of 60" is answered as follows: 1702

$\{2,3,4,5,6,10,12,15,20,30,60\}$

Determine if the set is complete or if it contains one of the common errors that are given as alternatives.

a. The set is complete.
b. The set of factors are confused in some way with multiples.
c. The set of factors are confused in some way with terms (addends).
*d. Some or all of the improper factors are missing.
e. Some or all of the proper factors are missing.

A response to the problem, "List all the factors of 60", is answered as follows: 1703

$\{1,2,3,4,5,6,10,12,15,20,30,60\}$

Determine if the set is complete or if it contains one of the common errors that are given as alternatives.

*a. The set is complete.
b. The set of factors are confused in some way with multiples.
c. The set of factors are confused in some way with terms. (Addends)
d. Some or all of the improper factors are missing.
e. Some or all of the proper factors are missing.

A response to the problem, "List all the factors of 60", is answered as follows: 1704

$\{1,2,3,4,5,6,10,12,15,20,30,40,45,60\}$

Determine if the set is complete or if it contains one of the common errors that are given as alternatives.

a. The set is complete.
b. The set of factors are confused in some way with multiples.
*c. The set of factors are confused in some way with terms. (Addends)
d. Some or all of the improper factors are missing.
e. Some or all of the proper factors are missing

A response to the problem "List all the factors of 60" is answered as follows: 1705

$\{1,2,3,4,5,6,10,12,15,20,30,60,120,180. . .\}$

Determine if the set is complete or if it contains one of the common errors that are given as alternatives.

a. The set is complete.
*b. The set of factors are confused in some way with multiples.
c. The set of factors are confused in some way with terms. (Addends)
d. Some or all of the improper factors are missing.
e. Some or all of the proper factors are missing.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY HIS KNOWLEDGE OF THE DEFINITION OF A FACTOR BY VERIFYING WHETHER A GIVEN NUMBER IS A FACTOR OR SOME COMBINATION OF GIVEN NUMBERS. 0464

Given three counting numbers r, s, and t; t is a factor of r. Determine if the statement, "t is a factor of $r \cdot s$" is ________. 1758

- *a. always true
- b. sometimes true
- c. never true

Given three counting numbers r, s, and t; t is a factor of r. Determine if the statement, "t is a factor of $r \div s$" is ________. 1759

- a. always true
- *b. sometimes true
- c. never true

THE STUDENT WILL APPLY HIS KNOWLEDGE OF FACTORS AND PRIME NUMBERS BY STATING HOW MANY FACTORS A LITERAL NUMBER CONTAINS. 0471

Let p be any prime number. How many factors does p^2 have? 1772

- a. 1
- b. 2
- *c. 3
- d. cannot answer from given information.

Let p and g be prime numbers. How many factors does $p \cdot g$ have? 1773

- *a. 4
- b. 3
- c. 1
- d. cannot answer from given information.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECALL THE DEFINITIONS OF PRIME AND RELATIVELY PRIME NUMBERS BY STATING WHAT TWO NUMBERS MUST BE IF THEY ARE GIVEN AS PRIME OR RELATIVELY PRIME. 0472

Which one of the following statements is true? 1774

- *a. If two numbers are prime, they must be relatively prime.
- b. If two numbers are relatively prime, both numbers must be prime.
- c. If two numbers are relatively prime, one of the numbers must be prime.

THE STUDENT WILL BE ABLE TO ANALYZE NUMBERS IN 2 SETS, IN ONE SET THE NUMBERS ARE PRIME AND IN THE OTHER SET THEY ARE NOT PRIME - BY IDENTIFYING A PROPERTY OF THE SET OF NUMBERS THAT ARE PRIME IN THE FIRST SET AND NOT PRIME IN THE SECOND SET. 0547

Directions: Analyze numbers that are prime in the set of complex numbers.

A prime number P is an integer greater than 1 that only has factors $\pm p$ and ± 1. 2,3,5,7,11...are prime numbers. Consider numbers of the form $x + iy$ where x and y are integers. Let C represent this set of numbers. A number is prime in C if its factors are $\pm p$, $\pm pi$ $\pm i$, ± 1

2 is not prime in C	$2 = (1 + i)(1-i)$
3 is prime in C	3 only has factors ± 3, ± 1, $\pm i$, $\pm 3i$
5 is not prime in C	$5 = (2 + i)(2-i)$
7 is prime in C	7 = only has factors ± 7, ± 1, $\pm i$, $\pm 7i$
11 is prime in C	
13 is not prime in C	

A property of all the numbers that are considered prime numbers, but are not prime in C is 1996

- a. that each can be written as the sum of the square of an odd and even number.
- b. that each has a remainder of one when divided by four.
- *c. that each can be written as the sum of two squares.
- d. that the difference between any two of these numbers is a multiple of four.

THE STUDENT DEMONSTRATES HIS ABILITY TO USE SYNTHETIC SUBSTITUTION OR DIVISION BY SELECTING THE CORRECT ILLUSTRATION OF THE PROCESS. 0152

What method below correctly illustrates synthetic substitution or synthetic division? 0425

a. $\begin{array}{r|rrrrr} 2 & 3 & -11 & 5 & -1 & 17 \\ & & 2 & -8 & -1 & -2 \\ \hline & 3 & -9 & -3 & -2 & 15 \end{array}$

*b. $\begin{array}{r|rrrrr} 3 & -6 & 4 & 3 & 2 & 5 \\ & & -18 & -42 & -117 & -345 \\ \hline & -6 & -14 & -39 & -115 & -340 \end{array}$

c. $\begin{array}{r|rrrr} 1 & 7 & 2 & -3 & 4 \\ & & 7 & -5 & 2 \\ \hline & 7 & -5 & 2 & 2 \end{array}$

d. $\begin{array}{r|rrrrr} -2 & 3 & -4 & 1 & 8 & -6 \\ & & -6 & -4 & 6 & -4 \\ \hline & 3 & 2 & -3 & 2 & -10 \end{array}$

Evaluate f (6) using synthetic substitution given 0426

$f(y) = 2y^5 - 5y^4 + 5y^3 - 20y^2 - 12y + 6$

a. $f(6) = 17823$
b. $f(6) = 4150$
c. $f(6) = 3960$
*d. $f(6) = 9366$

Evaluate p (1 - i) using synthetic substitution given 0427

$p(x) = x^3 + 2ix^2 + x + 2i$

*a. $p(x) = 3 - i$
b. $p(x) = i - 3$
c. $p(x) = 2i - 4$
d. $p(x) = 4 + i$

Find m so that p (2) = 6 if p (x) = $2x^3 - 3x^2 + 3x - m$ 0428

*a. m = 4
b. m = -3
c. m = 6
d. m = 2

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF THE FACTOR THEOREM AND THE REMAINDER THEOREM BY CHOOSING THE CORRECT QUOTIENT AND REMAINDER FOR A GIVEN FRACTION. 0153

Find the quotient and remainder when $3x^4 + 7x^3 - 5x^2 - x + 2$ is divided by $x + 3$. 0429

*a. $(3x^3 - 2x^2 + x - 4)$ Remainder 14
b. $(2x^3 + x^2 - 3x + 1)$ Remainder 7
c. $(x^3 + 2x^2 + 4x - 3)$ Remainder -10
d. $(-2x^3 + x^2 + 2x - 4)$ Remainder 3

Find Q(x) if $2x^3 - 7x^2 - 21x + 54 = (x - 2)\,Q(x)$ 0430

a. $3x^2 + x - 7 = Q(x)$
b. $2x^2 + 6x - 1 = Q(x)$
c. $2x^2 + 3x + 7 = Q(x)$
*d. $Q(x) = 2x^2 - 3x - 27$

Find all the real roots of the cubic equation 0431
$x^3 - 6x^2 + 11x - 6 = 0$

*a. {1, 2, 3}
b. {1, -1, 2}
c. {1, -4, 4}
d. {1, -6, 3}

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF FACTORING THE DIFFERENCE OF TWO SQUARES BY SELECTING THE CORRECT FACTOR FOR EACH ITEM. 0043

The factors of $16a^2 - b^4$ are 0046

a. $(4a + b)(4a - b)$
b. $(4a + b^2)(4a + b^2)$
c. $(4a - b)(4a - b)$
*d. $(4a + b^2)(4a - b^2)$

Given the polynomial expression $25x^2 - y^2$ and one of its factors $5x + y$, the other factor is 0047

a. $5x^2 - y^2$
b. $(5x + y)$
*c. $(5x - y)$
d. $5x^2 + y^2$

The factors of $m^2 - 16n^4$ are 0048

*a. $(m + 4n^2)(m - 4n^2)$
b. $(m + 4n)(m - 4n)$
c. $(m + 4n^2)(m + 4n^2)$
d. $(m + 4n)(m + 4n)$

THE STUDENT DEMONSTRATES HIS ABILITY TO IDENTIFY COMMON MONOMIAL FACTORS WHEN HE CHOOSES THE FACTORS FOR GIVEN EXPRESSIONS. 0240

The common monomial factor in $16x^3y + 12xy + 3$ is 1204

a. 4
b. 4xy
c. 3
*d. none of these

The polynomial $5x^2 + 5x - 30$ completely factored is 1205

a. $(5x - 15)(x - 2)$
b. $(x + 3)(5x - 10)$
*c. $5(x + 3)(x - 2)$
d. all of the above

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF FACTORING A BINOMIAL SUM OR BINOMIAL DIFFERENCE BY SELECTING THE CORRECT FACTORS FOR A GIVEN EXPRESSION. 0047

The correct factors of $n^2 + 14n + 33$ are 0058

*a. $(n + 3)(n + 11)$
b. $(n + 3)(n - 11)$
c. $(n - 3)(n - 11)$
d. $(n - 3)(n + 11)$

The factors of $x^2 - 19x + 90$ are 0059

a. $(x + 9)(x - 10)$
b. $(x + 9)(x + 10)$
c. $(x - 9)(x + 10)$
*d. $(x - 9)(x - 10)$

All positive integers c for which $x^2 + 5x + c$ can be factored over the set of binomials with integral coefficients are 0060

a. $\{2, 3\} = c$
b. $\{6, -1\} = c$
*c. $\{4, 6\} = c$
d. $\{4, -1\} = c$

The factors of $x^2 + 3x - 10$ are 0061

a. $(x - 2)(x - 5)$
b. $(x + 2)(x - 5)$
*c. $(x - 2)(x + 5)$
d. $(x + 2)(x - 5)$

Given the polynomial $a^2 - a - 90$ its factors are 0062

a. $(a - 9)(a + 10)$
b. $(a - 9)(a - 10)$
c. $(a + 10)(a + 9)$
*d. $(a + 9)(a - 10)$

The factors of $2y^2 + 7y + 3$ are 0063

*a. $(2y + 1)(y + 3)$
b. $(2y + 3)(y + 1)$
c. $(2y + 3)(y - 1)$
d. $(2y - 1)(y - 3)$

The factors of $6x^2 + 24x + 21$ are 0064

*a. $(3x + 3)(x + 7)$
b. $(3x + 7)(x + 3)$
c. $(3x - 7)(x - 3)$
d. $(3x + 7)(x - 3)$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO FACTOR A BINOMIAL BY CHOOSING A DESCRIPTION OF THE FACTORS OF A GIVEN EXPRESSION. 0207

Directions: Write the letter representing the best possible answer in the blank provided.

a. can be factored by dividing each term by the greatest common factor.
b. can be factored by the difference of two perfect squares
c. both a and b
d. cannot be factored

_a_ $25x^2 - 10x$ 0763

_d_ $x^2 + 9$ 0764

_a_ $3x^2 + 12$ 0765

_b_ $4x^2 - 25$ 0766

_c_ $16x^2 - 36$ 0767

_d_ $7x + 3$ 0768

_b_ $25 - x^2$ 0769

_a_ $2x^2 + 8$ 0770

_c_ $5x^2 - 125$ 0771

_c_ $4/9\ x^4 - 16x^2$ 0772

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF FACTORIZATION OF TRINOMIAL SQUARES BY SELECTING THE CORRECT FACTORS FOR A GIVEN SQUARE. 0046

The factors of $x^2 + 2bx + b^2$ are 0055

a. $(b - x)(b - x)$
b. $(x - b)(x + b)$
*c. $(x + b)(x + b)$
d. $(b - x)(b + x)$

The correct factors of $g^2 - 2gh + h^2$ are 0056

a. $(h + g)(h + g)$
b. $(g - h)(g + h)$
c. $(h + g)(h - g)$
*d. $(g - h)(g - h)$

Given the polynomial expression $9x^2 + 6x + 1$ and one of its factors $(3x + 1)$, the other factor would be 0057

- *a. $(3x + 1)$
- b. $(1 - 3x)$
- c. $(3x - 1)$
- d. $(1 + 3x)$

THE STUDENT WILL ANALYZE A PARTICULAR METHOD OF FACTORING A TRINOMIAL SQUARE BY CHOOSING THE CORRECT SOLUTION TO SIMILAR FACTORING PROBLEMS. 0175

Directions: Study the following examples of factoring a trinomial square.

$x^2 + 4x + 4$ in factored form is $(x + 2)(x + 2)$
$z^2 + 8z + 16$ in factored form is $(z + 4)(z + 4)$
$a^2 - 10a + 25$ in factored form is $(a - 5)(a - 5)$
$f^2 - 24a + 144a^2$ in factored form is $(f - 12a)(f - 12a)$

Write $e^2 - 6e + 9$ in factored form. 0577

- a. $(e + 9)(e + 9)$
- b. $(e + 3)(e - 3)$
- c. $(e - 6)(e - 6)$
- *d. $(e - 3)(e - 3)$

Write $b^2 + \frac{1}{4}b + \frac{1}{64}$ in factored form. 0578

- a. $(b - \frac{1}{8})(b - \frac{1}{8})$
- b. $(b + 8)(b + 8)$
- *c. $(b + \frac{1}{8})(b + \frac{1}{8})$
- d. none of the above

Write $4 + 4f + f^2$ in factored form. 0579

- *a. $(2 + f)(2 + f)$
- b. $(4 + f)(1 + f)$
- c. $(2 - f)(2 - f)$
- d. none of the above

THE STUDENT WILL BE ABLE TO DETERMINE THE SIGNS WHEN FACTORING A TRINOMIAL BY SELECTING THE CORRECT DESCRIPTION OF THE SIGNS FOR A GIVEN TRINOMIAL. 0191

Directions: Write the letter representing the correct answer in the block provided.

b $2x^2 - 3x + 10$ 0667

c $-x^2 + 10x + 8$ 0668

a $14x^2 + 8x + 5$ 0669

c $8x + 4 - 13x^2$ 0670

b $5 + 14x^2 - 3x$ 0671

c $6x^2 - 8 + 10x$ 0672

c $5x^2 + 4x - 3$ 0673

a $10x + 18x^2 + 4$ 0674

c $4x^2 - 10x - 8$ 0675

c $8 + 4x - 3x^2$ 0676

a. the signs in both factors are positive

b. the signs in both factors are negative

c. the signs are different - one negative and one positive

THE STUDENT CAN APPLY THE RULES FOR FACTORING POLYNOMIALS BY CHOOSING THE CORRECT FACTORS FOR A GIVEN POLYNOMIAL. 0241

The polynomial $6x^2 - 33x + 36$ factors as 1206

a. $3(2x - 3)(x - 4)$
b. $(6x - 9)(x - 4)$
c. $(2x - 3)(3x - 12)$
*d. all of the above

The polynomial $2x^2 + 5x - 12$ can be factored as 1207

a. $(2x + 3)(x - 4)$
b. $(2x + 3)(x + 4)$
*c. $(2x - 3)(x + 4)$
d. none of the above

The polynomial $4x^2 - 25$ can be factored as 1208

a. $(2x + 5)(2x + 5)$
*b. $(2x + 5)(2x - 5)$
c. $(2x - 5)(2x - 5)$
d. none of the above

The polynomial $x^2 + ax + bx + ab$ can be factored as 1209

*a. $(x + a)(x + b)$
b. $(x + ax)(x + b)$
c. $(x + a)(x + bx)$
d. none of the above

The polynomial $x^2 - 10x + 25$ can be factored as 1210

a. $(x + 5)(x + 5)$
*b. $(x - 5)(x - 5)$
c. $(x + 5)(x - 5)$
d. none of the above

The polynomial $x^2 - 5x - 24$ can be factored as 1211

a. $(x - 12)(x + 2)$
b. $(x - 6)(x + 4)$
*c. $(x - 8)(x + 3)$
d. none of the above

The polynomial $x^2 + 7x - 12$ can be factored as 1212

a. $(x + 4)(x + 3)$
b. $(x + 4)(x - 3)$
c. $(x - 4)(x + 3)$
*d. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF FACTORING POLYNOMIALS BY IDENTIFYING POLYNOMIALS THAT HAVE BEEN FACTORED INCORRECTLY. 0511

Which of the following polynomials has NOT been factored correctly? 1900

a. $x^3 - 8y^3 = (x - 2y)(x^2 + 2xy + 4y^2$
b. $(x - y)^2 - 2^2 = (x-y-2)(x-y+2)$
c. $x^4 + x^2 + 1 = (x^2 + x + 1)(x^2 - x + 1)$
d. $(a + b)^2 - (c + 4)^2 = (a + b + c + 4)(a + b - c - 4)$
*e. $a^2 - (b - c)^2 = (a + b - c)(a - b - c)$

Which of the following polynomials has NOT been factored correctly? 1901

a. $3x - 3y + cx - cy = (3 + c)(x - y)$
*b. $x^3 - 2x^2 + 4x + 8 = (x + 2)(x - 2)^2$
c. $x^2 + 6xy + 9y^2 - 25 = (x + 3y+ 5)(x + 3y - 5)$
d. $x^3 + 3x^2 + 3x + 9 = (x + 3)(x^2 + 3)$
e. $x^4 - y^4 = (x^2 + y^2)(x + y)(x - y)$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF THE FACTORING PROCESSES BY IDENTIFYING THE BEST PROCEDURE FOR FACTORING A POLYNOMIAL. 0512

One of the steps in factoring the polynomial $6(x-2)^2 + 5(x-2)(y+4) -21(y + 4)^2$ is 1902

a. $[6(x-2) - 7(y+4)][(x-2) + 3 (y+ 4)]$
b. $[3(x - 2) - 7 (y + 4)][2(x - 2) + 3 (y + 4)]$
c. $[3(x - 2) + 7 (y - 4)][2(x - 2) + 3 (y - 4)]$
*d. $[3(x - 2) + 7 (y + 4)][2(x - 2) - 3 (y + 4)]$
e. $[6(x - 2) - 3 (y + 4)][(x - 2) + 7 (y + 4)]$

Which procedure would be the fastest to factor the polynomial 1903

$3\ (x + 1)^{n + 1}\ (x + 3)^2 - 5\ (x + 1)^n\ (x + 3)^3$ is

a. $(x + 3)^2\ [\ 3\ (x + 1)^{n + 1} - 5\ (x + 1)^n\ ]$
*b. $(x + 1)^n\ (x + 3)^2\ (3x + 3 - 5x - 15)$
c. $(x + 1^n\ [\ 3\ (x + 1)(x + 3)^2 - 5\ (x + 3)^2]$
d. $(x + 1)^n\ (x + 3)^2\ (3x + 3 - 5x + 15)$
e. $(x + 1)^n\ (x + 3)^2\ (3 - 5x - 15)$

THE STUDENT WILL BE ABLE TO APPLY THE FACTORING PRINCIPLES BY SELECTING THE CORRECT FACTORS FOR A GIVEN EXPRESSION. 192

The correct factors of $x^2 - 8x + 7$ are: 0677

a. $(x + 7)(x - 1)$
b. $(x + 7)(x + 1)$
*c. $(x - 7)(x - 1)$
d. $(x - 7)(x + 1)$
e. cannot be factored

The correct factors of $5x^2 + 23x - 10$ are: 0678

*a. $(x + 5)(5x - 2)$
b. $(x - 5)(5x + 2)$
c. $(x + 10)(5x - 1)$
d. $(x - 1)(5x + 10)$
e. cannot be factored

The correct factors of $3x^2 + 10x - 8$ are: 0679

a. $(3x + 2)(x - 4)$
*b. $(3x - 2)(x + 4)$
c. $(3x + 4)(x - 2)$
d. $(3x - 4)(x + 2)$
e. cannot be factored

The correct factors of $2x^2 - 7 - 13x$ are: 0680

a. $(2x + 7)(x - 1)$
b. $(2x - 7)(x + 1)$
*c. $(2x + 1)(x - 7)$
d. $(2x - 1)(x + 7)$

The correct factors of $3x^2 - 8x + 5$ are: 0681

a. $(3x - 1)(x + 5)$
b. $(3x + 1)(x - 5)$
*c. $(3x - 5)(x - 1)$
d. $(3x + 5)(x + 1)$
e. cannot be factored

The correct factors of $4x^2 + 14x + 6$ are: 0682

a. $(2x + 3)(2x + 2)$
*b. $(4x + 2)(x + 3)$
c. $(4x + 1)(x + 6)$
d. $(4x + 6)(x + 1)$
e. cannot be factored

The correct factors of $-x^2 + x - 4$ are: 0683

a. $(x + 4)(x - 1)$
b. $(x - 4)(x + 1)$
c. $(x + 2)(x - 2)$
d. $(x - 2)(x + 2)$
*e. cannot be factored

The correct factors of $3x - x^2 - 2$ are: 0684

a. $(3x + 2)(x + 1)$
b. $(x + 2)(3x + 1)$
c. $(x + 2)(x + 1)$
*d. $(x - 1)(x - 2)$
e. cannot be factored

The correct factors of $3x^2 + 15x + 12$ are: 0685

- *a. $(3x + 12)(x + 1)$
- b. $(3x + 2)(x + 6)$
- c. $(3x + 3)(x + 4)$
- d. $(3x + 4)(x + 3)$
- e. cannot be factored

The correct factors of $5x - 2x^2 + 3$ are: 0686

- a. $(5x + 3)(x - 1)$
- b. $(2x - 3)(x + 1)$
- c. $(2x + 3)(x - 1)$
- *d. $(2x + 1)(x - 3)$
- e. cannot be factored

THE STUDENT WILL BE ABLE TO DETERMINE THE NUMBER OF POSSIBILITIES FOR THE FIRST OR LAST TERM WHILE FACTORING AN EXPRESSION BY CHOOSING THE NUMBER OF DIFFERENT FACTORS A TERM MAY HAVE. 0193

Directions: Write the letter representing the number of different factors a term may have.

- a. one pair of factors
- b. two pairs of factors
- c. three pairs of factors
- d. four pairs of possible factors
- e. none of the above

a	5	0687
a	x^2	0688
e	$6a^2$	0689
c	12	0690
e	$16t^2$	0691
b	34	0692
a	17	0693
c	20	0694
c	10x	0695
d	42	0696

THE STUDENT CAN USE THE FACTOR THEOREM IN CHOOSING POSSIBLE FACTORS FOR GIVEN EQUATIONS. 0281

If one root of a quadratic equation is +5, then which of the following algebraic expressions must be a factor of the original quadratic equation? 1353

a. $x + 5$
b. $5x - 25$
c. $2x - 5$
*d. $x - 5$

In the equation $2x^5 - 171x^4 + 88x^3 - 252x^2 + 3x - 2{,}570 = 0$ one could possibly consider $(x - 11/2)$ as a factor, 1354

*a. never
b. sometimes
c. always

THE STUDENT CAN DEMONSTRATE HIS KNOWLEDGE OF FACTORING PROCEDURES BY SIMPLIFYING RATIONAL EXPRESSIONS. 0514

The rational expression $\frac{6m^2 - 6m - 12}{m^3 - 8 - (m-2)^3}$ reduced to lowest terms is 1907

a. $\frac{6(m - 2)(m + 1)}{2m}$
b. 0
c. $3\ (m - 2)$
d. undefined
*e. $\frac{(m + 1)}{m}$

Which of the following expressions is equivalent to 1908

$\frac{x^2 - ax}{x^2 + a^2} \div \frac{ax + a^2}{a^4 - x^4} \div \frac{(x - a)^2}{a}$ if the operations indicated are performed?

a. $\frac{x(x - a)}{x + a}$
b. x
*c. $-x$
d. 0
e. $\frac{a^2}{x(x-a)^4}$

THE STUDENT ANALYZES THE SOLUTION OF AN EQUATION THRU FACTORING BY CHOOSING THE FACTORING STEP CONTAINING THE ERROR. 0244

Consider the following: $(y - 8)^2 = 100$

(1) $y^2 - 16y + 64 = 100$
(2) $y^2 - 16y - 36 = 0$
(3) $(y + 18)(y - 2) = 0$
(4) $y + 18 = 0$ or $y - 2 = 0$
(5) $\therefore\ y = -18, 2$

If there is an error in the above work, it occurs in 1218

a. 1
*b. 3
c. 4
d. 5
e. none of the above; there is no error

Consider the following: $(2x + 3)(x - 2) = 4$

$$(1)\ 2x^2 - 8x - 6 = 4$$
$$(2)\ 2x^2 - 8x - 10 = 0$$
$$(3)\ 2(x^2 - 4x - 5) = 0$$
$$(4)\ 2(x-5)(x + 1) = 0$$
$$(5)\ x - 5 = 0 \text{ or } x + 1 = 0$$
$$(6)\ x = 5, -1$$

If there is an error in the above solution it occurs in 1219

*a. 1
b. 2
c. 3
d. 4
e. none of the above; there is no error

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO COMPREHEND THE CONCEPT OF GCF (GREATEST COMMON FACTOR) BY SELECTING THE CORRECT VALUE FOR THE GCF FROM A NUMBER OF PLAUSIBLE VALUES. 0441

The GCF of 24 and 32 is 1708

a. $\{1, 2, 3, 4, 6, 8, 12, 16, 24, 32\}$
b. $\{1, 2, 4, 8\}$
c. 96
*d. 8
e. 32

The GCF of 20 and 28 is 1709

a. $\{1, 2, 4\}$
b. 140
c. $\{1, 2, 4, 5, 7, 10, 14, 28\}$
*d. 4
e. $\{0, 140, 280, 420, 560, \ldots\}$

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF THE MEANING OF GREATEST COMMON FACTOR BY DETERMINING A NUMBER GIVEN A SECOND NUMBER AND THE GREATEST COMMON FACTOR OF THE TWO. 0469

The greatest common factor for two numbers is 12. One of the numbers is 36. The other number is ______. 1770

a. 4
b. 144
c. 3
*d. 48
e. 72

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY THE DEFINITION OF GREATEST COMMON FACTOR BY DETERMINING THE EFFECT ON THE GREATEST COMMON FACTOR WHEN THE GIVEN NUMBERS ARE CHANGED. 0470

Given two counting numbers x and y. If each number is doubled, what effect willthis have on the greatest common factor of x and y? 1771

a. the greatest common factor will remain the same.
*b. the greatest common factor will be doubled.
c. the greatest common factor will be 1/2 as much.

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO COMPREHEND THE CONCEPT OF LCM (LEAST COMMON MULTIPLE) BY SELECTING THE CORRECT VALUE FOR THE LCM FROM A NUMBER OF PLAUSIBLE VALUES. 0442

The LCM of 24 and 32 is 1710

a. {1, 2, 4, 8}
b. {1, 2, 3, 4, 6, 8, 12, 16, 24, 32}
c. 8
d. 32
*e. 96

The LCM of 20 and 28 is 1711

- a. {1, 2, 4}
- *b. 140
- c. {1, 2, 4, 5, 7, 10, 14, 28}
- d. 4
- e. {0, 140, 280, 420, 560, . . .}

THE STUDENT CAN COMPREHEND THE CONCEPTS OF GCF and LCM BY BEING ABLE TO IDENTIFY WHAT THE BASIC REQUIREMENTS OF THESE VALUES WOULD BE AS RELATED TO THE CONCEPTS OF FACTOR AND MULTIPLE. 0440

Given the sets M,N,P,Q, related to the values of 24 and 32: 1706

M = {1,2,3,4,6,8,12,24}
N = {1,2,4,8,16,32}
P = {0, 24,48,72,96,120,...}
Q = {0, 32,64,96,128,...}

In order to be the GCF of 24 and 32, a number must be a member of

- a. N only
- *b. M and N
- c. Q only
- d. P and Q
- e. P only

Given the sets R,S,U,V, related to the values of 20 and 28: 1707

R = {1,2,4,5,10,20}
S = {1,2,4,7,14,28}
U = {0,20,40,60,80,...}
V = {0,28,56,84,112,...}

In order to be the LCM of 20 and 28, a number must be a member of

- a. R only
- b. R and S
- c. U only
- *d. U and V
- e. S only

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO ANALYZE A SET OF VALUES AS THEY PERTAIN TO THE CONCEPT OF MULTIPLES BY BEING ABLE TO RECOGNIZE A SET OF VALUES AS A CORRECT LISTING OF MULTIPLES OR AN EXAMPLE OF ONE OF THE COMMON ERRORS INVOLVED WHEN LISTING MULTIPLES. 0443

The set, $\{1,2,3,6,12,18,24,30,36..\}$ is 1712

- a. A correct list of multiples
- *b. An indication of confusion between the concepts of multiplé and factor.
- c. A correct list of multiples except for not including zero in the listing.
- d. A listing that does not take the multiples in their proper order.
- e. A listing that is not properly symbolized to indicate the complete listing.

The set, $\{0,6,12,18,24,30,36...\}$ is 1713

- *a. A correct list of multiples
- b. An indication of confusion between the concepts of multiple and factor.
- c. A correct list of multiples except for not including zero in the listing.
- d. A listing that does not take the multiples in their proper order.
- e. A listing that is not properly symbolized to indicate the complete listing.

The set, $\{1,2,3,6\}$ is 1714

- a. a correct list of multiples.
- *b. an indication of confusion between the concepts of multiple and factor.
- c. a correct list of multiples except for not including zero in the listing.
- d. a listing that does not take the multiples in their proper order.
- e. a listing that is not properly symbolized to indicate the complete listing.

The set, $\{0,6,12,18,24,30,36\}$ is 1715

a. a correct list of multiples.
b. an indication of confusion between the concepts of multiple and factor.
c. a correct list of multiples except for not including zero in the listing.
d. a listing that does not take the multiples in their proper order.
*e. a listing that is not properly symbolized to indicate the complete listing.

The set, $\{0,6,12,24,48,96.......\}$ is 1716

a. a correct list of multiples.
b. an indication of confusion between the concepts of multiple and factor.
c. a correct list of multiples except for not including zero in the listing.
*d. a listing that does not take the multiples in their proper order.
e. a listing that is not properly symbolized to indicate the complete listing.

PROBABILITY, COMBINATIONS AND PERMUTATIONS

THE STUDENT DISPLAYS A WORKABLE KNOWLEDGE OF PERMUTATIONS BY CHOOSING THE CORRECT NUMBER OF PERMUTATIONS FOR A GIVEN SET OF CIRCUMSTANCES. 0159

How many different ways can ten questions on a true-false test be answered? 0447

a. 1000
b. 974
*c. 1024
d. 1200

In how many different ways can four students be seated in a row? 0448

*a. 24
b. 30
c. 16
d. 40

An automobile manufacturer produces 7 models, each available in 6 different colors. In addition, the buyer can choose one of 4 different upholstery fabrics and one of five different colors of interior. How many varieties of cars can be ordered from the manufacturer? 0449

a. 760
*b. 840
c. 950
d. 820

How many positive four-digit odd integers can be formed from{1, 2, 3, 4, 5}? 0450

*a. 375
b. 405
c. 355
d. 425

A milliner wants to arrange six different flowers around the brim of a hat. In how many ways can she plan them? 0451

- a. 60
- b. 30
- *c. 720
- d. 120

How many permutations of the letters E Q U I N O X end in a consonant? 0452

- a. 720
- b. 1080
- *c. 2160
- d. 360

How many numerals for positive even integers less than 500 can be formed from $\{3, 4, 5\}$? 0453

- *a. 4
- b. 12
- c. 3
- d. 24

In how many ways can a girl arrange nine charms on a bracelet? 0454

- *a. 362,880
- b. 20,160
- c. 5,040
- d. 10,080

Find the number of permutations of all the letters of the word SEQUENCE. 0455

- a. $8!$
- b. $5!$
- *c. $\frac{8!}{3!}$
- d. $\frac{5!}{3!}$

In how many ways can five pennies, two nickels, and a dime be distributed among eight boys seated in a row if each boy receives a coin? 0456

*a. 168
b. 336
c. 84
d. 504

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF COMBINATIONS BY SELECTING NUMBER COMBINATIONS FOR A GIVEN SET OF CIRCUMSTANCES. 0160

A chef interested in using up some leftover meats and vegetables decides to make a stew consisting of three kinds of meat and four vegetables available. How many different kinds of stew can the chef make? 0457

*a. 105
b. 700
c. 175
d. 900

How many different committees of four persons each can be chosen from a group of six persons without regard to order? 0458

a. 5
b. 20
c. 45
*d. 15

How many four-letter arrangements of the letters C A P S U L E having three consonants and one vowel can be formed, if no letter is repeated? 0459

a. 10
b. 150
c. 24
*d. 288

Six points lie on the circumference of a circle. How many inscribed triangles can be drawn having these points as vertices? 0460

a. 120
*b. 20
c. 60
d. 30

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF THE CONCEPT OF PROBABILITY BY CHOOSING THE CORRECT PROBABILITY FOR A GIVEN EVENT. 0161

If the probability that it will rain on a given day is 1/3, what are the odds that it will not rain? 0461

a. 1 : 2
b. 2 : 3
*c. 2 : 1
d. 3 : 2

Three cards are drawn from a deck of 52 cards. What is the probability that they are all spades? 0462

*a. $\frac{11}{850}$
b. $\frac{1}{4}$
c. $\frac{1}{26}$
d. $\frac{10}{645}$

A bag contains 2 white marbles, 4 blue marbles, and 6 red marbles. A marble is drawn at random from the bag. What is the probability it is white? 0463

a. $\frac{1}{2}$
b. $\frac{1}{5}$
c. $\frac{1}{3}$
*d. $\frac{1}{6}$

If two cards are drawn from a standard deck of 52 cards, what is the probability that both are spades? 0464

a. $\frac{2}{13}$
b. $\frac{1}{26}$
*c. $\frac{1}{17}$
d. $\frac{1}{13}$

If two cards are drawn from a standard deck of 52 cards, what is the probability that both are Queens? 0465

*a. $\frac{1}{221}$
b. $\frac{1}{26}$
c. $\frac{13}{150}$
d. $\frac{4}{17}$

A die is rolled and a card is drawn from a standard deck of 52 cards. What is the probability that the die will show an even number and the card will be a heart? 0466

a. $\frac{1}{4}$
b. $\frac{3}{4}$
c. $\frac{1}{2}$
*d. $\frac{1}{8}$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THE DEFINITION OF N FACTORIAL BY SIMPLIFYING EXPRESSIONS CONTAINING THE FACTORIAL SYMBOL. 0548

An expression equivalent to $\frac{(n + r)!}{(n + r - 2)!}$ is 1997

a. $\frac{n + r}{n + r - 2}$

b. $- 1/2$

*c. $(n + r)(n + r - 1)$

d. $\frac{(n + r)(n - r - 1)}{n + r - 2}$

An expression equivalent to $\frac{n! - (n + 1)!}{n! + 1/2\, n(n - 1)!}$ is 1998

a. $\frac{2(2 - n)}{3}$

*b. $- \frac{2n}{3}$

c. $-2\ (n + 1)$

d. $-2n$

RADICALS

THE STUDENT DEMONSTRATES AN UNDERSTANDING OF RADICAL EXPRESSIONS BY SIMPLIFYING EACH RADICAL EXPRESSION OR SELECTING THE CORRECT PRODUCT OR QUOTIENT OF RADICAL EXPRESSIONS. 0079

$\frac{3}{\sqrt{2}}$ put into simplest form is: 0163

a. $\frac{3\sqrt{2}}{\sqrt{2}}$

*c. $\frac{3\sqrt{2}}{2}$

b. $\frac{\sqrt{6}}{2}$

d. $\frac{3\sqrt{2}}{4}$

$6\sqrt{\frac{20}{9}}$ put into simplest form is: 0164

a. $\frac{6\sqrt{10}}{3}$

c. $\frac{6\sqrt{5}}{9}$

*b. $4\sqrt{5}$

d. $2\sqrt{10}$

$6\sqrt{\frac{11}{12}}$ put into simplest form is: 0165

a. $\frac{3\sqrt{11}}{3}$

c. $6\sqrt{132}$

b. $6\sqrt{33}$

*d. $\sqrt{33}$

$\frac{2\sqrt{7}+\sqrt{14}}{\sqrt{7}}$ put into simplest form is: 0166

*a. $2+\sqrt{2}$

c. $14+7\sqrt{2}$

b. $14+\sqrt{98}$

d. $2\sqrt{14}+7\sqrt{2}$

$(3\sqrt{b}) \cdot (-4\sqrt{b})$ 0167

a. $12b$

c. $-12b^2$

b. $12b^2$

*d. $-12b$

$(-5\sqrt{ab^2})(-3\sqrt{a})$ 0168

*a. 15ab

c. $15a^2b^2$

b. $-15a^2b^2$

d. $-15ab$

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF RADICAL EXPRESSIONS BY SIMPLIFYING EACH RADICAL EXPRESSION AND THEN SELECTING THE CORRECT SUM OR DIFFERENCE OF RADICAL EXPRESSIONS. 0080

Select the simplified form of $\sqrt{75} + 2\sqrt{48} - 5\sqrt{27}$ 0169

a. $5\sqrt{3} + 16\sqrt{3}$

*c. $-2\sqrt{3}$

b. $8\sqrt{3} - \sqrt{27}$

d. $15\sqrt{3}$

Select the simplified form of $\sqrt{72} + 3\sqrt{98} - 2\sqrt{32}$ 0170

a. $29\sqrt{2}$

c. $11\sqrt{2}$

b. $23\sqrt{2}$

*d. $19\sqrt{2}$

Select the simplified form of $\frac{\sqrt{18} - \sqrt{32}}{\sqrt{2}}$ 0171

*a. -1

c. 1

b. -2

d. 2

Select the simplified form of $\sqrt{6} + \sqrt{\frac{2}{3}}$ 0172

a. $\frac{\sqrt{6}}{3}$

c. $\frac{2\sqrt{6}}{3}$

b. $\sqrt{2}$

*d. $\frac{4}{3}\sqrt{6}$

THE STUDENT DEMONSTRATES HIS ABILITY TO MULTIPLY BINOMIALS CONTAINING RADICALS BY SELECTING THE CORRECT SIMPLIFIED FORM FOR EACH PRODUCT OR QUOTIENT. 0081

Select the simplified form of $(2 + \sqrt{3})(2 - \sqrt{3})$ 0173

a. -1
*b. 1
c. $\sqrt{5}$
d. $-\sqrt{5}$

Select the simplified form of $2\sqrt{6}\ (3\sqrt{2} + \sqrt{3})$ 0174

a. $8\sqrt{30}$
b. $12\sqrt{3}$
*c. $12\sqrt{3} + 6\sqrt{2}$
d. $6\sqrt{6}$

Select the simplified form of $\dfrac{2x}{\sqrt{3} - 1}$ 0175

a. $2x\sqrt{3}$
b. $2x\sqrt{3} + 2x$
c. $4x\sqrt{3}$
*d. $x\sqrt{3} + x$

Select the simplified form of $\dfrac{\sqrt{5} - 3\sqrt{3}}{\sqrt{5} - \sqrt{3}}$ 0176

a. $14 - 4\sqrt{15}$
*b. $-2 - \sqrt{15}$
c. $7 - 2\sqrt{15}$
d. $5\sqrt{15}$

THE STUDENT DEMONSTRATES HIS ABILITY TO PUT A RADICAL EXPRESSION TO SIMPLEST FORM BY CHOOSING THE CORRECT SIMPLEST FORM. 0105

$\frac{1}{2}\sqrt{50}\sqrt{10}$ put into simplest form is 0266

a. $\frac{1}{2}\sqrt{500}$

b. $\frac{5}{2}\sqrt{10}$

*c. $5\sqrt{5}$

d. $\sqrt{10}$

The simplest form of $\sqrt[5]{x^7 y^{10}}$ is 0267

*a. $xy^2\sqrt[5]{x^2}$

b. $xy\sqrt[5]{x^2 y^2}$

c. $x^5 y^5\sqrt[5]{x^2 y^2}$

d. $xy^2\sqrt[5]{x^2 y^2}$

$\sqrt[6]{128x^{-8} y^{12}}$ in simplified form is 0268

a. $2y^2\sqrt[6]{2x^4}$

b. $2y^2\sqrt[6]{x^4}$

*c. $\frac{2y^2\sqrt[6]{2x^4}}{x^2}$

d. $\frac{2y^2\sqrt{x^4}}{x^2}$

Simplify $\sqrt[5]{\left(\frac{r^{-10}}{243}\right)^{-4}}$ 0269

*a. $81\ r^8$

b. $243\ r^3$

c. $\frac{1}{81\ r^8}$

d. $\frac{1}{243\ r^3}$

Simplify $\sqrt[3]{\frac{54\, x^{4}\, y^{-6}}{2x^{-2}}}$ 0270

a. $\frac{x^2}{y^2} \cdot \sqrt[3]{54}$

b. $3x^2\, y^2$

c. $\frac{x^2}{y^2} \cdot \sqrt[3]{54x}$

*d. $3\, \frac{x^2}{y^2}$

Simplify $\frac{\sqrt[4]{2a^{-1}}}{\sqrt[4]{128\, a^{-5}}}$ 0271

a. $\frac{\sqrt[4]{64}}{64a}$

b. $a\, \frac{\sqrt[4]{128}}{a}$

c. $4\, \sqrt[4]{a^2}$

*d. $\frac{a\, \sqrt[4]{4}}{4}$

THE STUDENT DEMONSTRATES HIS ABILITY TO RATIONALIZE THE DENOMINATOR OF A FRACTION, THAT IS, CLEAR THE DENOMINATOR OF ALL RADICALS, BY CHOOSING THE CORRECT PRODUCT FOR A GIVEN SET OF FACTORS. 0108

Rationalize the denominator of $\frac{3}{\sqrt{7} + 1}$ 0277

a. $\frac{3 - 3\sqrt{7}}{2}$

*b. $\frac{\sqrt{7} - 1}{2}$

c. $\frac{1 - \sqrt{7}}{7}$

d. $\frac{3\sqrt{7}}{2}$

Rationalize the denominator of $\frac{12}{4 + 3\sqrt{6}}$ 0278

*a. $\frac{-6\,(4 - 3\sqrt{6})}{19}$

b. $6\,(3\sqrt{6} - 4)$

c. $\frac{48 - 36\sqrt{6}}{19}$

d. $3\,(\sqrt{6} - 4)$

THE STUDENT APPLIES HIS KNOWLEDGE OF RADICAL EXPRESSIONS IN EXPONENTIAL FORM BY CHOOSING THE CORRECT SIMPLIFICATION FOR EACH EXPRESSION. 0121

$\sqrt[3]{2^5} \cdot \sqrt[4]{2}$ expressed in simplified form is: 0316

*a. $2\sqrt[12]{2^{11}}$

b. $2\sqrt[12]{2^5}$

c. 2^5

d. $2^6\sqrt[3]{2^2}$

Express $(a^4\, b^{\frac{-2}{3}})^{\frac{3}{2}}$ in its simplified form 0317

a. $a^{\frac{11}{2}}\, b^{\frac{5}{6}}$

b. $a^{\frac{5}{2}}\, b^{-2}\sqrt[6]{b^{-1}{}_{-1}}$

*c. $a^6\, b^{-1}$

d. $a^{\frac{8}{3}}\, b^{\frac{-4}{3}}$

Evaluate the expression $\frac{3}{4} \div \left(\frac{1}{8}\right)^{\frac{-2}{3}}$ 0318

a. 3

b. $\frac{1}{8}$

c. $\frac{16}{3}$

*d. $\frac{3}{16}$

Simplify $\sqrt[4]{2^{1.6} \div 2^{-3.8}}$ 0319

a. $2^{\frac{-2.2}{4}}$ *b. $2^{\frac{5.4}{4}}$

c. $2^{\frac{-.3}{4}}$ d. $2^{\frac{.3}{4}}$

Simplify $36^{\sqrt{5}} \div 6^{\sqrt{40}}$ 0320

a. $6^{(\sqrt{5} - \sqrt{40})}$

b. $6^{\sqrt{8}}$

*c. $36^{(\sqrt{5} - \sqrt{10})}$

d. $36^{\sqrt{8}}$

THE STUDENT WILL BE ABLE TO SIMPLIFY RADICALS AND TRANSLATE SIMPLIFIED FORM BACK INTO RADICALS BY SELECTING THE CORRECT ALTERNATE FORM. 0260

Given: $\sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$

$\sqrt{8} = \sqrt{4 \cdot 2} = 2\sqrt{2}$

$6\sqrt{3}$ represents

a. $\sqrt{18}$
b. $\sqrt{72}$
*c. $\sqrt{108}$
d. $\sqrt{124}$
e. none of the above

$9\sqrt{2} =$

*a. $\sqrt{162}$
b. $\sqrt{108}$
c. $\sqrt{81}$
d. $\sqrt{36}$
e. $\sqrt{18}$

$\sqrt{864} =$

a. $12\sqrt{3}$
b. $8\sqrt{6}$
c. $6\sqrt{6}$
*d. $12\sqrt{6}$
e. none of the above

$\sqrt{242} =$

a. $4\sqrt{12}$
b. $2\sqrt{121}$
*c. $11\sqrt{2}$
d. $12\sqrt{2}$

THE STUDENT DEMONSTRATES HIS ABILITY TO TRANSLATE RADICALS WHERE RADICALS ARE FRACTIONS BY CHOOSING THE CORRECT SIMPLEST FORM. 0274

The simplest form of $\sqrt{\frac{7}{20}}$ is ____________. 0984

a. $\frac{\sqrt{7}}{2\sqrt{5}}$ *b. $\frac{\sqrt{35}}{10}$

c. $\frac{\sqrt{140}}{20}$ d. $10\sqrt{35}$

The simplest form of $\sqrt{1\frac{3}{5}}$ is __________. 0985

*a. $\frac{2}{5}\sqrt{10}$ b. $\sqrt{\frac{8}{5}}$

c. $\frac{2\sqrt{2}}{5}$ d. $\sqrt{\frac{40}{5}}$

IN WORKING WITH PRODUCTS OF SUMS WHOSE TERMS INVOLVE RADICALS THE STUDENT CAN SHOW UNDERSTANDING BY WRITING THE PRODUCT IN SIMPLE RADICAL FORM. 0374

Express $(2\sqrt{3} + 3\sqrt{2})(\sqrt{6} - \sqrt{2})$ in simple radical form. 1495

a. $2\sqrt{18} + 3\sqrt{12} - 2\sqrt{6} - 3\sqrt{4}$
b. $2\sqrt{18} + 3\sqrt{12} - 2\sqrt{6} - 6$
c. $6\sqrt{2} - 6$
*d. $6\sqrt{2} + 6\sqrt{3} - 2\sqrt{6} - 6$

THE STUDENT CAN UNDERSTAND USING POWERS WITH RATIONAL EXPONENTS BY WRITING RADICAL EXPRESSIONS IN EXPONENTIAL FORM. 0418

Give the value of the symbol $(9/49)^{-1/2}$.

a. $3/7$
b. $\pm 7/3$ 1626
c. $\pm 3/7$
*d. $7/3$

Write $\sqrt[4]{16\ x^{-6}\ y^{3}}$ in exponential form.

*a. $2x^{-3/2}\ y^{3/4}$
b. $2\ x^{-2/3}y^{4/3}$ 1627
c. $\pm\ 2\ x^{-3/2}y^{3/4}$
d. $\pm\ 2\ x^{-2/3}y^{4/3}$

Simplify $\sqrt[3]{3^2}\ .\ \sqrt[6]{3^7}$ and express the answer in simple radical form.

a. $\sqrt[6]{3^{11}}$ 1628
*b. $3\sqrt[6]{3^5}$
c. 3
d. $\sqrt[3]{3^2}\ .\ \sqrt[6]{3^7}$

Simplify $\left(\sqrt[3]{\sqrt{x^6}}\right)\left(\sqrt{\sqrt{x^4}}\right)$, leave result in simplest radical form.

a. x 1629
b. $\sqrt{x}$
*c. x^2
d. x^9

Simplify $(x^{1/2} + y^{7/2})(x^{1/2} - y^{7/2})$. Leave result in simplest radical form. 1630

a. $x + y$
*b. $x - y^7$
c. $x - y$
d. $x + y^7$

Simplify $10^{3.4} \times 10^{-0.4} \div 10^{-0.35}$ 1631

a. $10^{4.15}$
b. $10^{1.71}$
*c. $10^{3.35}$
d. $10^{2.65}$

THE STUDENT WILL BE ABLE TO DEMONSTRATE KNOWLEDGE OF THE USE OF RADICALS IN SOLVING CALCULATION PROBLEMS BY SELECTING THE APPROPRIATE INEQUALITY SIGN TO BE USED IN THE STATEMENT OF THE RESULT. 0323

In the following problems, determine which symbols should be inserted to make the statements correct.

$\sqrt{4} + \sqrt{1}$ __ $\sqrt{5}$ 0878

a. $=$
*b. $>$
c. $<$

$(\sqrt{x + 3})^2 + \sqrt{x^2}$ __ $2x + 9$ 0879

a. $=$
b. $>$
*c. $<$

$(\sqrt{x+3} + \sqrt{x^2})^2 \underline{\quad} 2x + 9$ 0880

a. =
*b. >
c. <

$(\sqrt{x} + 2)^2 \underline{\quad} x + 4$ 0881

a. =
*b. >
c. <

$\frac{7}{\sqrt{x} - \sqrt{y}} \underline{\quad} \frac{7\sqrt{x} + 7\sqrt{y}}{x - y}$ 0882

*a. =
b. >
c. <

$\sqrt{\frac{4x^3y^5}{7xy^8}} \underline{\quad} \frac{2x}{7y}\sqrt{7y}$ 0883

a. =
b. >
*c. <

$\sqrt{\frac{24a^7b^9c^5}{5x^3y^7z^9}} \cdot \sqrt{\frac{5x^2yz}{6a^3b^6c}} \underline{\quad} \frac{2a^2bc^2}{y^3z^4}\sqrt{bx}$ 0884

a. =
b. >
*c. <

$\sqrt{2x^2y^4d^8} \underline{\quad} 1.414xy^2d^4$ 0885

a. =
*b. >
c. <

$\sqrt[3]{27} + \sqrt[3]{9} - 9 - 7\sqrt[3]{9}$ __ $6\sqrt[3]{9}$ 0886

a. =
b. >
*c. <

$^3\sqrt{-1} - \sqrt{-1}$ __ 0 0887

a. =
b. >
*c. <

THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE SUMS OF SIMILAR RADICALS BY CHOOSING THE CORRECT SIMPLIFICATION FOR A GIVEN SUM. 0106

The sum of $\frac{1}{3}\sqrt{27}$ and $-2\sqrt{3}$ is: 0272

a. $-\frac{5}{3}\sqrt{25}$
b. $-\frac{25}{3}$
c. $\sqrt{3}$
*d. $-\sqrt{3}$

Find the sum of $2\sqrt[4]{64y^8} - \sqrt[4]{4y^8} + \sqrt[4]{324}$ 0273

*a. $3\sqrt[4]{4}(y^2 + 1)$
b. $y^2\sqrt[4]{4}$
c. $\sqrt[4]{60y^8} + 3\sqrt[4]{4}$
d. $\sqrt[4]{4}(3\sqrt[4]{4} + y^2)$

Find the sum of $5\sqrt[3]{24y} + \frac{-2y^2}{3}\sqrt[3]{\frac{81y}{y^2\;y}}$ 0274

a. $10\sqrt[3]{3y}$

b. $-2y\sqrt[3]{3y}$

*c. $\sqrt[3]{3y}\,(10 - 2y)$

d. $8y\sqrt[3]{3y}$

THE STUDENT CAN REWRITE AN EXPRESSION OF RADICALS INVOLVING ADDITION AND/OR SUBTRACTION BY SHOWING THE SUM OR DIFFERENCE IN SIMPLE RADICAL FORM. 0373

Write the expression $\sqrt{72} + \sqrt{98} - 1/3\sqrt{54}$ in simple radical form. 1493

a. $3\sqrt{8} + 7\sqrt{2} - 3\sqrt{6}$

b. $2\sqrt{8} + 7\sqrt{2} - \sqrt{6}$

c. $13\sqrt{2} - 3\sqrt{6}$

* d. $13\sqrt{2} - \sqrt{6}$

Write the expression $\sqrt[3]{\frac{1}{3000}} - 9\sqrt[3]{\frac{5}{5000}}$ in simple radical form. 1494

a. $\frac{1}{10}\sqrt[3]{\frac{1}{3}} - \frac{9}{10}$

*b. $\frac{1}{30}\sqrt[3]{9} - \frac{9}{10}$

c. $\frac{1}{30}\sqrt[3]{9} - \frac{9}{100}$

d. $-\frac{14}{15}$

THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE PRODUCT OF RADICAL EXPRESSIONS BY CHOOSING THE CORRECT SIMPLIFICATION FOR A GIVEN FORM. 0107

The product of $(5\sqrt[3]{4} - 1)$ and $(5\sqrt[3]{4} + 1)$ is 0275

*a. $50\sqrt[3]{2} - 1$

b. $99\sqrt[3]{2}$

c. $25\sqrt[3]{2} + 10\sqrt[3]{4} - 1$

d. $25\sqrt[3]{4} - 1$

The product of $\left(\sqrt[4]{a^3} + a\right)$ and $\left(\sqrt[4]{a} - 1\right)$ is 0276

a. $\sqrt[4]{a^4} - a$

b. $a\sqrt[4]{a} + a$

c. $-\sqrt[4]{a^3} + \sqrt[4]{a^4}$

*d. $a\sqrt[4]{a} - \sqrt[4]{a^3}$

THE STUDENT CAN SHOW UNDERSTANDING OF THE PRODUCT PROPERTY OF RADICALS BY SELECTING THE CORRECT FORM OF A GIVEN RADICAL. 0376

Express $2\sqrt{128}$ in simple radical form. 1498

a. $2\sqrt{128}$

b. $4\sqrt{32}$

c. $8\sqrt{8}$

*d. $16\sqrt{2}$

Express $\sqrt[3]{32x^4y^2}$ in simple radical form. 1499

a. $x\sqrt[3]{32xy^2}$

*b. $2x\sqrt[3]{4xy^2}$

c. $2\sqrt[3]{32x^4y^2}$

d. $\sqrt[3]{32x^4y^2}$

Express the product $\sqrt{40} \cdot \sqrt{\frac{7}{5}}$ in simple radical form. 1500

a. $\sqrt{56}$

b. $3\sqrt{6}$

*c. $2\sqrt{14}$

d. $\sqrt{\frac{280}{5}}$

THE STUDENT WILL SHOW HIS ABILITY TO RECALL THE PROCEDURE FOR RATIONALIZING THE DENOMINATOR BY FINDING THE CORRECT EXPRESSION NECESSARY TO MULTIPLY BOTH NUMERATOR AND DENOMINATOR TO OBTAIN A DENOMINATOR FREE OF RADICALS. 0517

In order to rationalize $\frac{1}{\sqrt[3]{x} - \sqrt[3]{y}}$ should be multiplied by 1912

a. $\sqrt[3]{x^2} - \sqrt[3]{y^2}$

b. $\sqrt[3]{x^2} + \sqrt[3]{y^2}$

c. $\sqrt[3]{x^2 - xy + y^2}$

d. $\sqrt[3]{x^2 + y^2}$

*e. $\sqrt[3]{x^2} + \sqrt[3]{xy} + \sqrt[3]{y^2}$

In order to rationalize the denominator of $\frac{2}{1 + \sqrt{2} - \sqrt{3}}$ 1913

in the least number of steps, it would be best not to multiply the numerator and denominater by

a. $1 + \sqrt{2} + \sqrt{3}$
b. $1 - \sqrt{2} + \sqrt{3}$
c. $1 - \sqrt{2} - \sqrt{3}$
*d. $1 + \sqrt{2} - \sqrt{3}$
e. $-1 + \sqrt{2} + \sqrt{3}$

THE STUDENT CAN SHOW UNDERSTANDING OF THE QUOTIENT PROPERTY OF RADICALS BY CHANGING A FRACTION CONTAINING RADICALS INTO SIMPLE RADICAL FORM. 0375

Express $\frac{5\sqrt{250x}}{15\sqrt{5x^3}}$ in simple radical form. 1496

a. $\frac{5\sqrt{50}}{15x}$

b. $\frac{\sqrt{50}}{3x}$

*c. $\frac{5\sqrt{2}}{3x}$

d. $\frac{5\sqrt{2}}{x}$

Express $\sqrt{\frac{1}{x^6 + x^4}}$ in simple radical form. 1497

a. $\frac{1}{x^3 + x^2}$

b. $\frac{1}{x^3} + \frac{1}{x^2}$

c. $\frac{1}{x^2}\sqrt{\frac{1}{x^2 + 1}}$

*d. $\frac{1}{x^4 + x^2}\sqrt{x^2 + 1}$

e. $\frac{1}{x^5}$

THE STUDENT WILL BE ABLE TO PERFORM THE OPERATIONS OF ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION WITH RADICALS BY CHOOSING THE CORRECT ANSWER FOR A GIVEN OPERATION. 0210

The product $\sqrt{6} \cdot \sqrt{14}$ expressed in simplest form is: 0791

a. $2\sqrt{5}$
b. $2\sqrt{7}$
*c. $2\sqrt{21}$
d. $\sqrt{84}$
e. none of the above

The sum $\sqrt{5} + \sqrt{20}$ expressed in simplest form is: 0792

a. $\sqrt{25}$
b. 5
c. $2\sqrt{5}$
*d. $3\sqrt{5}$
e. none of the above

The quotient $\sqrt{70} \div \sqrt{7}$ expressed in simplest form is: 0793

*a. $\sqrt{10}$
b. $2\sqrt{5}$
c. $\sqrt{63}$
d. $3\sqrt{7}$
e. none of the above

The difference $4\sqrt{5} - \sqrt{5}$ expressed in simplest form is: 0794

a. 4
b. $4\sqrt{0}$
*c. $3\sqrt{5}$
d. $4\sqrt{10}$
e. none of the above

The product $\sqrt{30} \cdot \sqrt{12}$ expressed in simplest form is: 0795

a. $\sqrt{42}$
b. $2\sqrt{90}$
c. $5\sqrt{10}$
*d. $6\sqrt{10}$
e. none of the above

The sum of $\sqrt{63} + 2\sqrt{27}$ expressed in simplest form is: 0796

a. $2\sqrt{7} + 5\sqrt{3}$
b. $8\sqrt{10}$
c. $9\sqrt{10}$
d. $2\sqrt{90}$
*e. none of the above

The quotient $6\sqrt{15} \div 3\sqrt{5}$ expressed in simplest form is: 0797

a. 2
*b. $2\sqrt{3}$
c. 6
d. $\frac{1}{2}\sqrt{3}$
e. none of the above

The quotient $4\sqrt{30} \div \sqrt{60}$ expressed in the simplest form is: 0798

a. 2
b. $3\sqrt{\frac{1}{2}}$
c. $4\sqrt{\frac{1}{2}}$
*d. $2\sqrt{2}$
e. none of the above

The difference $\sqrt{30} - \sqrt{10}$ expressed in simplest form is: 0799

a. $2\sqrt{10}$
b. $\sqrt{20}$
c. $2\sqrt{5}$
d. $5\sqrt{2}$
*e. none of the above

The answer to $\sqrt{5}\ (\sqrt{20} - \sqrt{15})$ expressed in simplest form is: 0800

a. 5
b. $10 - \sqrt{15}$
c. $5\sqrt{2} - \sqrt{75}$
*d. $10 - 5\sqrt{3}$
e. none of the above

FROM A LIST OF SOLUTION SETS, THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE RADICAL EQUATIONS BY SELECTING THE CORRECT SOLUTION SET FOR A GIVEN EQUATION. 0082

The solution set for the equation $\sqrt{2y} = 2$ is: 0177

*a. $y = \{2\}$
b. $y = \{1\}$
c. $y = \{\ \}$
d. $y = \{0\}$

Select the solution set for the equation $\sqrt{\frac{r}{2}} = 1$ 0178

a. $r = \{1\}$
b. $r = \{\frac{1}{2}\}$
c. $r = \{\ \}$
*d. $r = \{2\}$

Select the solution set for the equation $\sqrt{\frac{3x - 5}{4}} = 2$ 0179

a. $x = \{\frac{11}{3}\}$
*b. $x = \{7\}$
c. $x = \{\frac{13}{3}\}$
d. $x = \{1\}$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY THEOREMS INVOLVING RADICALS BY CORRECTLY SOLVING EQUATIONS WHICH CONTAIN RADICALS. 0540

The solution set for x in $\sqrt{5x - 1} - \sqrt{2x - 3} = 2$ is 1976

a. $\{-2, -26/9\}$
b. $\{2\}$
c. $\{2/3\}$
*d. $\{2, 26/9\}$
e. none of the above

The solution set for x in $\frac{x}{\sqrt{x + 1}} + \frac{2x}{\sqrt{x+3}} = 0$ is 1977

a. $\{0,1/3\}$
b. $\{-1\}$
c. $\{0,-7/5\}$
d. $\{1\}$
*e. $\{0\}$

The solution set for x in $\frac{1}{\sqrt{x}} - \frac{2}{\sqrt{x+27}} = 0$ is 1978

a. $\{27\}$
b. $\{3\}$
*c. $\{9\}$
d. $\{0\}$
e. none of the above

The solution set for x in $\sqrt{x+1} - \sqrt{x-6}$ is 1979

a. $\{3\}$
b. $\{42\}$
c. $\{12\}$
*d. $\{\emptyset\}$
e. none of the above

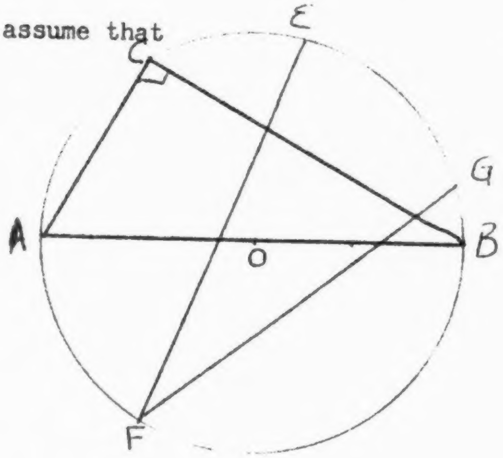
PROOFS, LOGIC, THEOREMS AND AXIOMS

THE STUDENT WILL ANALYZE A THEOREM AND SHOW HIS UNDERSTANDING OF IT BY SOLVING RELATED PROBLEMS AND DEVELOPING OTHER THEOREMS. 0162

Given: Theorem I: An angle inscribed in a semicircle is a right angle. (Use this information for following items.)

Applying the given theorem, one should assume that 0528

a. ∠EAB is an acute angle.
b. $\widehat{CB} = 90^\circ$
c. ∠ACB = 90°
d. $\widehat{ACB}$ is a semicircle
e. ∠GFE = 90°
f. all of the above
*g. c and d



Find the measure of ∠EFG when $\widehat{EG} = 70^\circ$ 0529

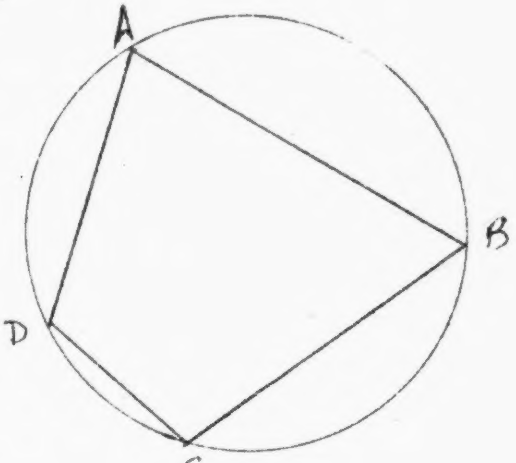
a. 70°
b. 140°
*c. 35°
d. not enough information given

Find the measure of $\widehat{EB}$ when ∠EAB = 50° 0530

a. 200°
b. 50°
*c. 100°
d. not enough information given

Theorem II: The measure of an inscribed angle is equal to ______________ the intercepted arc. 0531

a. one-third
b. twice
*c. one-half
d. There is no relationship



The measure of angle DAB is equal to ___________. 0532

*a. $\frac{1}{2}\widehat{DCB}$
b. $\widehat{DCB}$
c. $2(m\widehat{BAD})$
d. $2(m\widehat{DCB})$

The measure of angle DCB is equal to ________. 0533

*a. $\frac{1}{2}\widehat{DAB}$
b. $\widehat{DAB}$
c. $2\ (m\widehat{DCB})$
d. $2\ (m\ \widehat{DAB})$

$m\ \angle DAB + m\ \angle DCB =$ ___________. 0534

a. 360^{o}
b. 90^{o}
*c. 180^{o}
d. 270^{o}

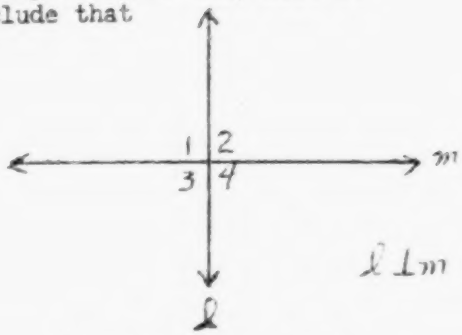
Theorem III: The opposite angles of a quadrilateral inscribed in a circle are: 0535

a. equal
*b. supplementary
c. 360^{o}
d. complementary

THE STUDENT CAN SHOW HIS UNDERSTANDING OF A THEOREM BY CHOOSING THE CONCLUSION THAT BEST SATISFIES THE THEOREM. 0163

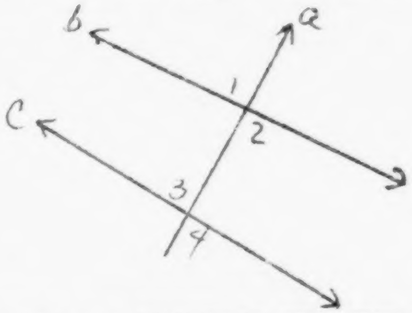
Applying the theorem: "If 2 lines are perpendicular they meet so as to form right angles" one should conclude that 0536

a. $\angle 2 = \angle 3$
b. line m and l intersect
c. $\angle 1$ and $\angle 2$ are supplementary
*d. $\angle 2$ is a right angle
e. all of the above
f. none of the above



Applying the theorem: "In a plane, if two lines are perpendicular to a third line, they are parallel to each other" one should conclude that 0537

a. $\angle 1 = \angle 2$
b. $\angle 2 = \angle 3$
*c. $b \parallel c$
d. all of the above
e. none of the above



THE STUDENT WILL BE ABLE TO ANALYZE THE GEOMETRIC THEOREMS FOR THEIR INTERRELATIONSHIPS BY SELECTING STATEMENTS WHICH EITHER CANNOT BE PROVEN ON THE BASIS OF OTHERS OR WHICH DEPEND ON OTHER STATEMENTS. 0257

Which of the below theorems cannot be proven on the basis of the others? 0956

a. If parallel lines are cut by a transversal the alternate interior angles are congruent.
b. If parallel lines are cut by a transversal the corresponding angles are congruent.
*c. The measure of an exterior angle of a triangle is greater than the measure of each remote interior angle.
d. If a line is perpendicular to one of two parallel lines, it is perpendicular to the other.
e. The measure of an exterior angle of a triangle is equal to the sum of the measures of the remote interior angles.

Considering the logical forms of implication, what is the smallest number of independent proofs necessary to prove these five statements? 0957

Given: a) If two sides of a triangle are congruent, the angles opposite them are congruent.
b) If two angles of a triangle are congruent the sides opposite them are congruent.
c) If a triangle is equilateral, it is equiangular.
d) If a triangle is equiangular, then it is equilateral.
e) If a triangle is scalene, then none of its angles are congruent.

*a. 1
b. 2
c. 3
d. 4
e. 5

How many of these theorems follow from one or more of the others? 0958

a) If a line is perpendicular to each of two intersecting lines at their intersection then it is perpendicular to the plane which contains them.
b) If two lines are perpendicular to a plane they are coplanar.
c) If two lines are perpendicular to a plane, they are parallel.
d) Parallel planes are everywhere equidistant.

a. 1
*b. 2
c. 3
d. They are all independent

Given the following two relations: 0959

a) The sum of the lengths of two sides of a triangle is greater than the length of the third side.
b) If AB + BC = AC then A, B, C are collinear points and B is between A and C.

Which of the following do these together illustrate?

a. contrapositives of one another
b. Converses of one another
c. completeness property of real numbers
d. transitivity of order
*e. uniqueness of order

THE STUDENT WILL BE ABLE TO DEVELOP A THEOREM FROM AN UNFAMILIAR MATHEMATICAL SITUATION BY SELECTING A NAMED TERM IN A SERIES. 0357

Instructions: Study each of these identities. After you have identified the characteristics common to both, answer each of the following questions.

$\sin 3x = 3 \sin x - 4 \sin^3 x$

$\sin 5x = 5 \sin x - 20 \sin^3 x + 16 \sin^5 x$

The last term in an expression for sin 7x in terms of sin x will be 1069

*a. $-64 \sin^7 x$

b. $36 \sin^7 x$

c. $-256 \sin^7 x$

d. $64 \sin^7 x$

e. none of the above

The expression in the right hand member of the equation will contain 1070

a. six terms
b. five terms
*c. four terms
d. none of the above

The second term in the expression will be 1071

a. $-140 \sin^3 x$

*b. $-56 \sin^3 x$

c. $120 \sin^3 x$

d. $56 \sin^3 x$

e. none of the above

The expression for sin 9x in terms of sin x is

$$\sin 9x = 9 \sin x - 120 \sin^3 x + 432 \sin^5 x - 576 \sin^7 x + 256 \sin^9 x$$

Consider your answers to the followin items; the expression above for sin 9x and then answer the following questions about the expansion of sin nx in terms of sin x

The first term will be 1072

a. sin nx
*b. n sin x
c. −n sin x
d. none of the above

The last term will be 1073

a. $-2^{n-1} \sin^n x$ *b. $(-1)^{\frac{n+3}{2}} 2^{n-1} \sin^n x$

c. $(-1)^{\frac{n+1}{2}} 2^{n-1} \sin^n x$ d. $2^{n-1} \sin^n x$

e. none of the above

In the expression there will be exactly 1074

*a. $\frac{n+1}{2}$ terms
b. (n−1) terms
c. $\frac{n-1}{2}$ terms
d. none of the above

THE STUDENT WILL BE ABLE TO DEVELOP A THEOREM FROM AN UNFAMILIAR MATHEMATICAL SITUATION BY CHOOSING THE STEPS IN DETERMINING THE ALGEBRAIC DESCRIPTION FOR A LOCUS. 0358

Instructions: You are asked to write an algebraic description for the locus of the minimum point of the set T if T = $(x,y)/y = ax^2 + bx + c$ where a,b,c, R, a and c are constants and b varies over the reals.

Consider each of the following procedures and select the one which you would use to determine the locus. Select one of the first group of alternatives then one of the second group and finally one from group 3.

First I would

1075

a. choose a, b, and c so that $a = c$ and $b > 0$
b. choose a,b, and c so that $a = c$ and $-r < b < r$ for $r > 0$
c. choose a, b, and c so that $a = c$ and $s < b < r$ where $s < 0$, $r > 0$ and $s \neq r$
d. choose $a \neq c$ and $b > 0$
*e. choose $a \neq c$ and $-r < b < r$ for $r > 0$
f. choose $a \neq c$ and $s < b < r$ for $s < 0$, $r > 0$, $s \neq r$

Then I would

1076

a. Graph several members of T
b. Write the coordinates of the minimum points for several members of T
*c. Plot the minimum points for several members of T

And finally I would

1077

*a. guess at a possible algebraic description for the locus and test it by substitution.
b. make a table of values for the coordinates of the minimum points and deduce an equation from the table (if I could).
c. guess at a possible algebraic description for the locus and try to prove it.

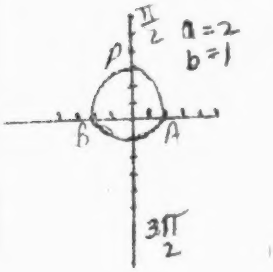
The theorem which describes my hypothesis is

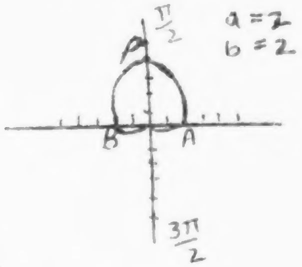
1078

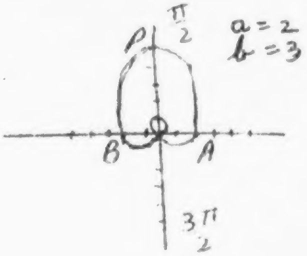
a. $M = \{(x,y)/y = \frac{1}{2}ax + c\}$
b. $M = \{(x,y)/y = -ax + c\}$
*c. $M = \{(x,y)/y = -ax^2\}$

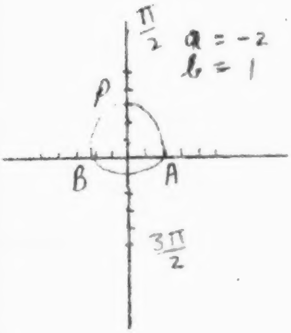
THE STUDENT WILL BE ABLE TO DEVELOP A THEOREM FROM AN UNFAMILIAR MATHEMATICAL SITUATION BY DETERMINING WHETHER GIVEN GENERALIZATIONS ARE SUPPORTED BY VARIOUS GRAPHS.

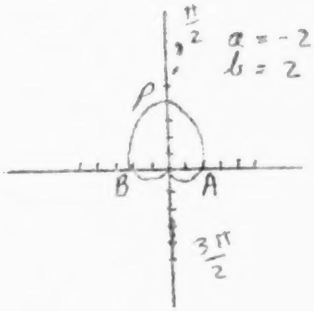
Directions: Each of the following is a graph for specific members of P if $P = \{(p, \theta) \mid p = a + b \sin \theta\}$ Study each one carefully.

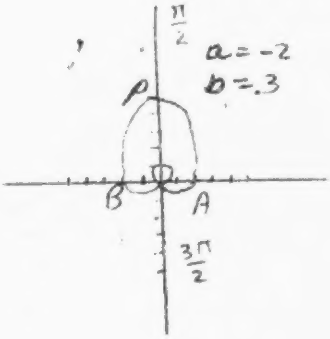


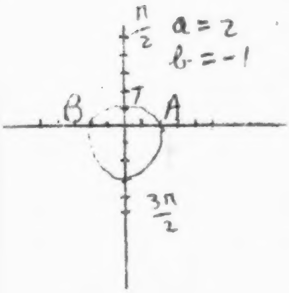


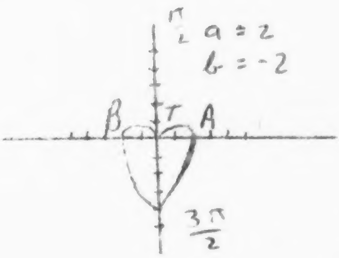


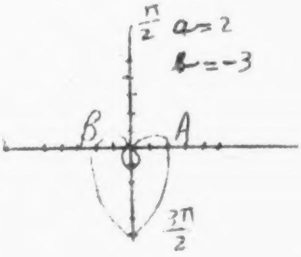


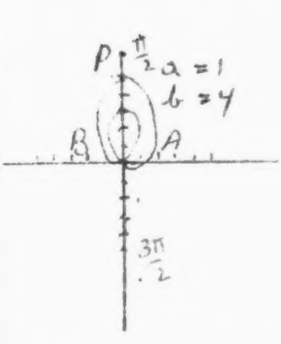


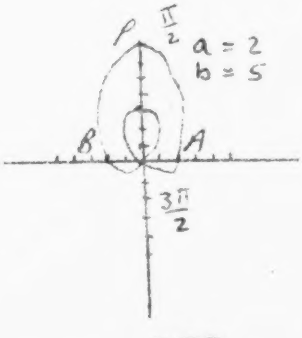


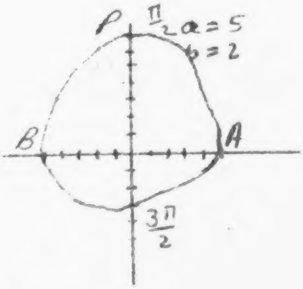












After having considered each graph carefully, decide whether each of the following generalizations is

a. supported by evidence supplied in graphs
b. unsupported by evidence supplied in graphs
c. not associated with graphic evidence

If $b < a$, as $(a - b)$ increases, the graph approaches a circle 1079

a. a
*b. b
c. c

If $a < b$, as a-b increases the graph has an inner loop which approaches the appearance of the outer loop. 1080

a. a
*b. b
c. c

If a=b the point $(\frac{3\pi}{2}, 0)$ in on the graph for all values of a and b. 1081

*a. a
b. b
c. c

The point whose coordinates are $(\frac{3\pi}{2}, 0)$ is on the graph for a, b R. as long as a=b or $a < b$ 1082

a. a
*b. b
c. c

The distance AB is always equal to the distance PT. 1083

*a. a
b. b
c. c

The distance AB is / 2a / for all values of a and b. 1084

*a. a
b. b
c. c

There is no value of a and b for which the distance PT=0. 1085

a. a
b. b
*c. c

As b decreases the distance PT decreases. 1086

a. a
*b. b
c. c

The graph does not change if a is replaced by (-a). 1087

*a. a
b. b
c. c

The graph does not change if b is replaced by (-b). 1088

a. a
*b. b
c. c

There is no value of a for which the graph is a circle. 1089

a. a
b. b
*c. c

The value of b has no relation to the position of point T. 1090

a. a
*b. b
c. c

THE STUDENT WILL SHOW HIS KNOWLEDGE OF ELEMENTARY GEOMETRIC THEOREMS BY RECALLING THE CONCLUSIONS WHEN GIVEN THE HYPOTHESIS. 0576

If two angles are both congruent and supplementary, each is a(n) _____angle. 2062

a. acute
*b. right
c. obtuse
d. scalene

If two sides of a triangle are congruent ______. 2063

*a. the angles opposite these sides are congruent.
b. the triangle is equilateral.
c. the angle included between these sides is a right angle.
d. the triangle is scalene.

In a plane, through a given point on a line, ______. 2064

a. there are an infinite number of lines perpendicular to the line.
b. there are two lines perpendicular to the line.
c. there is not a line perpendicular to the line.
*d. there is one and only one line perpendicular to the line.

Medians to the congruent sides of an isosceles triangle ______. 2065

a. are perpendicular
b. bisect each other
c. bisect the angles from which theu were drawn
*d. are congruent

If two distinct points are each equidistant from the end points of a segment then the line determined by these two points _____. 2066

a. bisects the given segment
b. is perpendicular to the given segment
*c. both a and b
d. neither a nor b

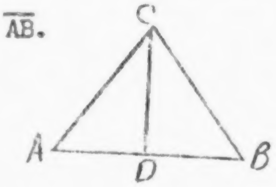
Any two medians of a(n) ______ triangle are congruent. 2067

a. isosceles
b. scalene
c. right
*d. none of the above

THE STUDENT CAN DEMONSTRATE LOGICAL REASONING BY CHOOSING THE MOST DIRECT METHOD IN SOLVING GEOMETRIC PROOFS. 0165

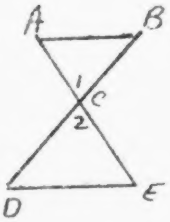
The most direct method of proving that $AC = BC$, is to show that 0542

a. $\overline{CD}$ is the perpendicular bisector of $\overline{AB}$.
b. $\angle ACD = \angle BCD$
c. $\triangle ACD \cong \triangle BCD$
*d. $\angle A = \angle B$



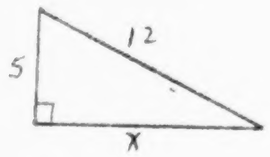
The most direct method of proving that $\angle 1 = \angle 2$ is to show that 0543

*a. $\angle 1$ and $\angle 2$ are verticle $\angle$s.
b. $\angle 1$ and $\angle 2$ are right $\angle$s.
c. $AC = CE$
d. corresponding parts of congruent triangles are equal.



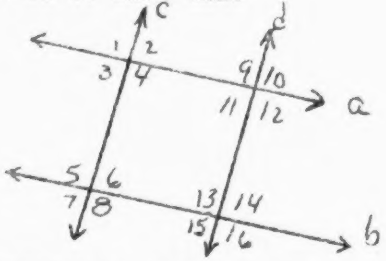
The most direct method of finding the measurement of side X is to use 0544

a. the 45°, 45°, 90° triangle relationship
b. a ruler
*c. the Pythagorean Theorem
d. the 30°, 60°, 90° triangle relationship



The most direct method of proving that $c \parallel d$ is to show that 0545

a. $\angle 2 = \angle 6$
b. $a \parallel b$
*c. $\angle 6 = \angle 15$
d. $\angle 1 = \angle 4$



THE STUDENT CAN IDENTIFY THE FALLACY IN A GEOMETRIC PROOF, THUS DEMONSTRATING HIS ABILITY TO ANALYZE SUCH PROOFS. 0222

Study the following proof: 1144

Given: $a=b$

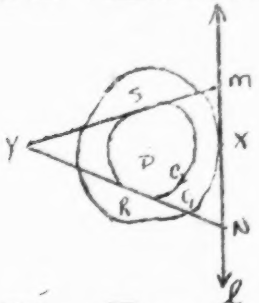
(1) $a^2 = ab$
(2) $a^2-b^2 = ab - b^2$
(3) $(a+b)(a-b) = b(a-b)$
(4) $a+b = b$
(5) $2b = b$
(6) $2 = 1$

The fallacy in the above argument occurs in step number

a. two
b. three
*c. four
d. five
e. None of the above; there is no error.

THE STUDENT WILL BE ABLE TO ANALYZE A GEOMETRIC PROOF BY COMMENTING ON LOGICAL ORDER, CORRECT USE OF SYMBOLISM, AND COMPLETENESS OF THOUGHT. 0266

Given the following proof, evaluate it.



Given: Concentric circles C_1 and C_2 with center at P. Tangents to C_2 from Y intersect C_2 at S and R; l is tangent to C_1 at x; Y-P-X.

Prove: YM = YN

1. $\overline{YS}$ and $\overline{YR}$ are tangent to C_2 at S and R l tangent to C_1 at X; Y-P-X.	1. Given
2. YP bisects ∠MYN	2. Ray through center of circle through exterior point bisects the angle formed by the tangent rays from that point.
3. ∠XYN ≅ ∠XYN	3. Definition of bisect
4. Draw $\overline{XY}$	4. Two points determine a line
5. $\overline{YX} \cong \overline{YX}$	5. Identity
6. ∠PXM = ∠PXN	6. Perpendicular lines form right angles; all right angles are congruent
7. △PXM ≅ △PXN	7. SAS
8. YN = YM	8. CPCT

Which of the statements above are out of logical order? 1011

a. 1
b. 3
*c. 4
d. 5
e. none of the above

In which of the pairs of statements and reasons is there incorrect use of symbolism? 1012

a. 1
b. 3
*c. 6
d. 8
e. None of the above

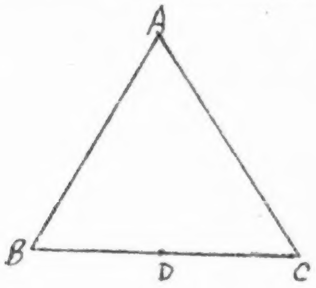
Between which of the pairs of statements is there a necessary statement omitted? 1013

a. Between 2 and 3
b. Between 3 and 4
c. Between 4 and 5
*d. Between 5 and 6
e. Between 6 and 7
f. Proof is complete, no statement omitted.

Which of the statements may be omitted without loss of completeness? 1014

a. 2
b. 4
c. 5
*d. Proof is complete, no statement may be omitted.

THE STUDENT WILL BE ABLE TO ANALYZE THE USE OF AUXILIARY SETS BY DETERMINING WHEN THEY ARE NECESSARY AND USABLE IN GIVEN PROOFS. 0268

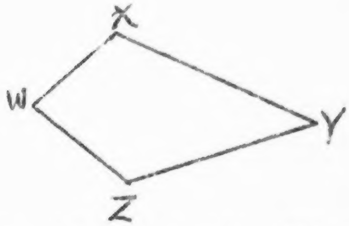


AB = AC
Sue, Jim, and Bob wished to prove that in ABC, BD = CD

Sue constructed $\underline{\overline{AD}} \perp \overline{BC}$.
Jim constructed $\overline{AD}$ bisecting_ A.
Bob constructed the median $\overline{AD}$.

They all then proceeded to prove BD = CD. Which of the three constructed an incorrect proof? 1023

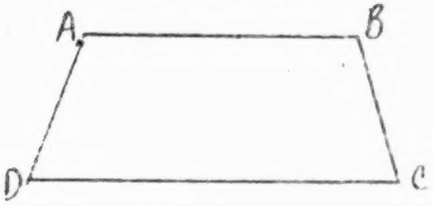
a. Sue
b. Jim
c. Bob
*d. all of the above
e. none of the above



W,X,Y,Z are coplanar, WX = WY, and M ∠ X = M ∠ Y 1024

Which of the following sets will help to prove XZ = YZ?

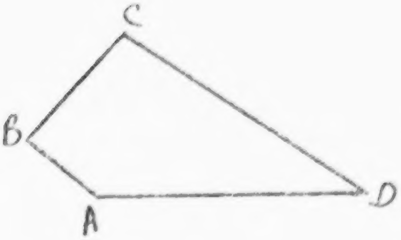
a. $\overline{WZ}$
b. WM bisecting ∠ W
c. $\overline{XN}$ bisecting ∠ X
*d. $\overline{XY}$
e. at least two of the above are usable



$\angle C \cong \angle D$, $\overline{AC} = \overline{BD}$ but $\overline{AB}$ is not = $\overline{CD}$. 1025

Which of the following will not be usable in proving A = B?

a. $\overline{AD}$ and $\overline{BC}$.
b. A C and BD
c. AM and BN both $\perp$ $\overline{CD}$.
d. at least two of the above are not usable
*e. all are usable

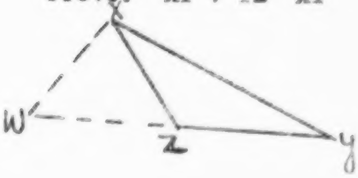


$\overline{AB}$ is shortest segment and $\overline{CD}$ the longest. In a triangle the angle opposite the shortest side is smallest, angle opposite longest side is largest. 1026

Which of the following auxiliary sets could not be used in proving $m\angle B = m\angle D$?

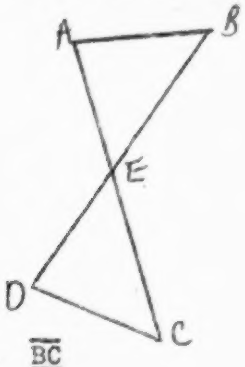
- a. $\overline{AC}$
- b. $\overline{BE}$ such that B-A-E and BE = CD
- c. $\overline{BD}$
- *d. at least two of the above are not usable
- e. all are usable

Prove: XY + YZ XY



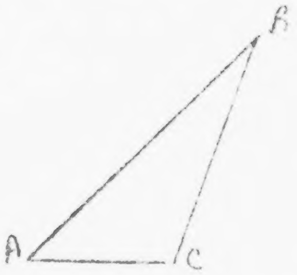
In proving that the sum of the length of two sides of a triangle must be greater than the length of the third side, we find on ray opposite $\overrightarrow{zy}$, zw = zx. Our justification is 1027

- a. betweenness
- b. definition of opposite ray
- *c. point-plotting theorem
- d. ruler postulate
- e. none of the above



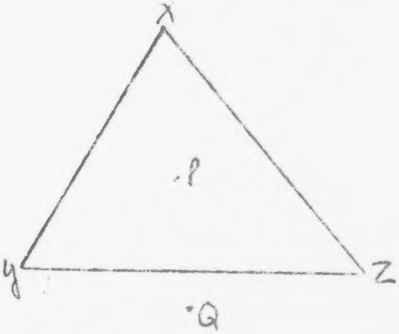
$\overline{AB} \cong \overline{CD}$, $\overline{AC} \cong \overline{BD}$ 1028
Which of the following auxiliary sets can be used to prove $\triangle ABE \cong \triangle CDE$?

- a. $\overline{BC}$
- b. $\overline{AD}$
- *c. $\overline{BC}$ or $\overline{AD}$ or both
- d. $\overline{BC}$ and $\overline{AD}$ but neither are necessary
- e. none of the above



To prove ∠BCA is obtuse construct 1029

a. $\overrightarrow{AC}$
b. $\overline{CD}$ bisecting ∠ BCA
c. $\overline{BC}$
*d. $\overline{BE} \perp \overrightarrow{AC}$
e. none of the above



Given XYZ. The following are introduced as auxiliary sets 1030

I. $\overrightarrow{YP}$ bisecting < Y
II. $\overline{XO} \perp \overline{YZ}$
III. $\overline{PQ}$ the perpendicular bisector of $\overline{YZ}$
IV. $\overrightarrow{ZP}$ intersecting $\overline{XY}$ at M

Which of the sets cannot be used?

a. I and III
b. II and IV
c. I, III, IV
*d. I, II, III
e. none are usable

THE STUDENT WILL BE ABLE TO USE ALGEBRAIC OR LOGICAL SYMBOLISM TO PROVE A RELATIONSHIP OR PREDICT AN OUTCOME FROM A SET OF CRITERIA BY SELECTING THE CORRECT METHOD OF SOLUTION. 0270

Demonstrate a method of solution of the following problem:

Eight marbles all have the same size, shape, and color. Seven of the marbles have the same weight and the other marble is heavier. Find the heavier marble using a balance scale if you are allowed only two weighings.

In the first weighing, on each tray there will be 1040

a. 1 marble
b. 2 marbles
*c. 3 marbles
d. 4 marbles
e. insufficient evidence

In the second weighing on each tray of the scale will be 1041

a. 1 marble
b. 2 marbles
c. 3 marbles
d. 4 marbles
*c. insufficient evidence

If seven marbles were of equal weight and the eighth marble was either heavier or lighter how many weighings would be the smallest number possible to find the "odd-ball"? Consider chance possibility possible. 1042

a. 2
*b. 3
c. 4
d. 5
e. not determinable

THE STUDENT CAN ANALYZE AN INDIRECT PROOF BY SELECTING PROPER CHOICES FROM A GIVEN LIST TO COMPLETE THAT PROOF. 0377

Directions: In questions below, you are given that $(3 - \sqrt{6})$ is a root of the equation $x^2 - 6x + 3 = 0$. Use this fact to prove that $(3 - \sqrt{6}))$ is irrational or rational by selecting your answers from the list below:

a. irrational
b. $\{-1, 1, -3, 3\}$
c. rational
d. $\{\pm 1, \pm 1/3\}$

*b The set of possible rational roots of $x^2 - 6x + 3 = 0$ is ____ 1501

*c Since $3 - \sqrt{6}$ is not an element of this set, $3 - \sqrt{6}$, cannot be ______________. 1502

*a Hence $3 - \sqrt{6}$ is ______________. 1503

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE A PROOF FOR VALIDITY BY SELECTING THE STEP IN THE SOLUTION OF A PROBLEM THAT IS INVALID. 0482

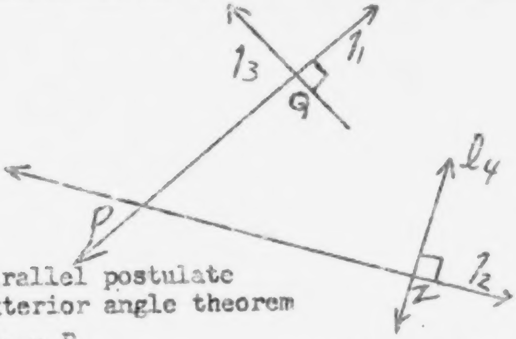
Test your ability to select improper procedures by selecting the invalid step in the argument below: 1797

To 'prove' that $0 > 3$, Let n be any number such that $n > 3$

- a. $n > 3 \rightarrow 3n > 3(3)$
- b. $3n \quad 3(3) \rightarrow 3n - n^2 > 9 - n^2$
- c. $3n - n^2 > 9 - n^2 \rightarrow n(3 - n) > (3 - n)(3 + n)$
- *d. $n(3 - n) > (3 - n)(3 + n) \rightarrow n > 3 + n$
- e. $n > 3 + n \rightarrow 0 > 3$

THE STUDENT WHEN CONFRONTED WITH AN INDIRECT PROOF SITUATION WILL ANALYZE THE POSSIBLE PROOFS AND SELECT THE CONTRADICTION(S) THAT WOULD RESULT. 0583

In proving the following; if $l_1 \cap l_2 = P$, $l_3 \perp l_1$, at Q, and $l_4 \perp l_2$ at Z, then $l_3 \cap l_4 \neq \emptyset$, an indirect proof must be used. This indirect proof leads to several contradictions. Which one of the following statements has NO contradictory statement? 2084



- *a. the parallel postulate
- b. the exterior angle theorem
- c. $l_1 \cap l_2 = P$
- d. through a point not on a line there is one and only one line perpendicular to the line.

In the proof of the theorem "If two distinct coplanar lines are intersected by a transversal making a pair of alternate interior angles congruent, the lines on parallel' the assumption the lines are not parallel was made which lead to the contradiction of the ________. 2085

*a. exterior angle theorem
b. definition of parallel lines
c. supplements of congruent angles are congruent theorem
d. definition of corresponding angles

THE STUDENT WILL ANALYZE A STATEMENT CONCERNING ALTITUDES OF TRIANGLES WHICH IS TO BE PROVEN AND SELECT THE RELATIONSHIP THAT IS NOT POSSIBLE FOR THE PROOF 0591

In the proof of the statement 'the altitude from the vertex of the angle included by the congruent sides of an isosceles triangle bisects the opposite side of the triangle'. If the triangles formed were proven congruent, which of the following will not be a possible reason. 2125

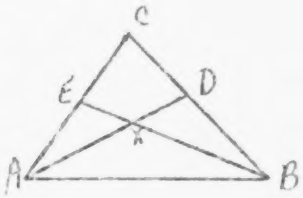
a. hypotenuse-leg
b. SAA correspondence
*c. SSA correspondence
d. SAS correspondence
e. All are valid

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO ANALYZE PROOFS BY DETERMINING WHICH SIDES OR ANGLES CAN BE PROVEN CONGRUENT FROM A STATEMENT OR FIGURE. 0659

In trying to prove triangle RST congruent to triangle TYR, which parts can be proved using the reflexive property of congruence? 2536

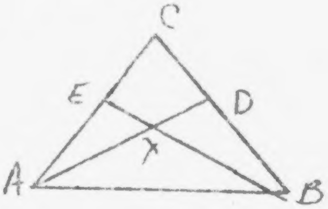
a. $\overline{RS}$
b. $\overline{YR}$
c. angle R
d. angle S
*e. RT
f. not enough information given to prove anything

When trying to prove triangle ADC congruent to triangle BEC, which of the following parts can be proved using the reflexive property of congruence? 2537



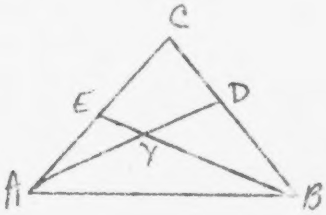
- a. angle D
- *b. angle C
- c. segment $\overline{BC}$
- d. angle X
- e. none of the above

When trying to prove triangle AEX congruent to triangle BDX, the following parts can be proved congruent from the figure. 2538



- *a. a pair of vertical angles
- b. a common side
- c. a common angle
- d. none of the above

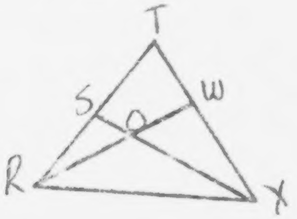
When trying to prove triangle ADC congruent to triangle ADB, you can prove the following parts from the figure. 2539



- a. angle D
- b. side $\overline{AB}$
- c. $\overline{CD} \cong \overline{DB}$
- d. angle A
- *e. none of the above

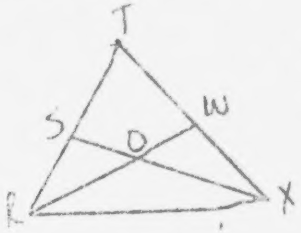
THE STUDENT CAN DEMONSTRATE HIS ABILITY TO COMPREHEND PROOFS BY DETERMINING WHICH TRIANGLES TO PROVE CONGRUENT WHEN HE IS GIVEN SIDES OR ANGLES TO BE PROVED CONGRUENT. 0660

In order to prove $\overline{SO} \cong \overline{WO}$, which of the following triangles should be proved congruent first? 2540



a. triangles TWR and TSX
*b. triangles RSO and XWO
c. triangles RWX and XSR
d. triangles ROX and WOX
e. none of the above

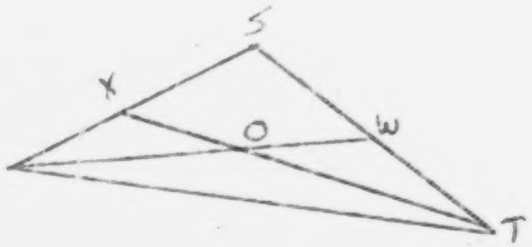
In trying to prove $\overline{WX} \cong \overline{SR}$, then which pair of triangles must be proved congruent first? 2541



a. triangles, RWT and XST
*b. triangles RXS and XRW
c. triangles ROS and RWX
d. triangles ROX and WOX
e. none of the above

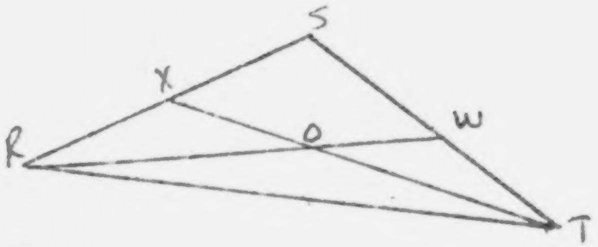
THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO ANALYZE PROOFS BY DETERMINING WHICH PARTS WOULD HELP HIM PROVE TRIANGLES CONGRUENT. 0661

Which of the following congruencies would help you prove triangle XOR congruent to triangle WOT? 2542



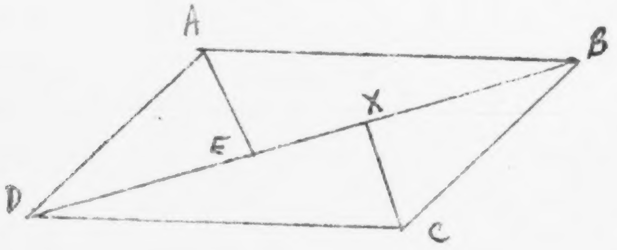
a. $\overline{SX} \cong \overline{SW}$
b. $\angle XRT \cong \angle WTR$
*c. $\overline{OR} \cong \overline{OT}$
d. $\overline{XT} \cong \overline{WR}$
e. none of the above

Which of the following congruencies would help you prove triangle SWR congruent to SXT? 2543



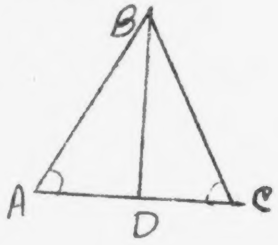
a. $\overline{OT} \cong \overline{OR}$
b. $\angle WRT \cong \angle TXR$
c. $\overline{WT} \cong \overline{XR}$
d. $\angle RWT \cong \angle TXR$
*e. none of the above

Which of the following congruencies would help you prove triangle AED congruent to triangle CXB? 2544



a. $\angle ABE \cong \angle CDX$
b. $\angle BAE \cong \angle DCX$
*c. $\angle AEB \cong \angle CXD$
d. $\overline{AB} \cong \overline{DC}$
e. none of the above

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO RECALL THE PROCESS OF INDIRECT PROOF BY SELECTING THE DENIAL STATEMENT. 0668



Given: $\overline{AB} \cong \overline{BC}$, $\angle A \cong \angle C$
$\overline{AD} \ncong \overline{DC}$

Prove: ABD $\ncong$ DBC

In the above example the denial statement should be 2562

*a. $\angle ABD \cong \angle DBC$
b. $\overline{AB} \ncong \overline{BC}$
c. $\angle A \ncong \angle C$
d. $\overline{AD} \cong \overline{DC}$

Given: $\overline{AB} \cong \overline{BC}$, $\angle A \cong \angle C$
$\overline{AD} \ncong \overline{DC}$

Prove: $\angle ABD \ncong \angle DBC$

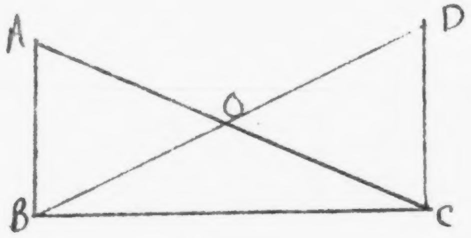
In the above example, the statement that is first proved false is 2563

a. $\overline{AB} \cong \overline{BC}$
b. $\angle A = \angle C$
*c. $\overline{AD} \ncong \overline{DC}$
d. $\angle ABD \neq \angle DBC$

THE STUDENT WILL BE ABLE TO APPLY THE RULES OF CONGRUENCE BY CHOOSING THE CORRECT METHOD OF PROVING TRIANGLES CONGRUENT. 0677

2588

If $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$, and $\angle A \cong \angle D$, then triangle ABC is congruent triangle DCB by



a. ASA
b. SAS
c. SSS
*d. SAA
e. HL

2589

If $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$, and $\overline{AC} \cong \overline{BD}$, then triangle ABC is congruent to triangle DCB by

a. ASA
b. SAS
c. SSS
d. SAA
*e. HL

2590

If $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$, and $\overline{AB} \cong \overline{BD}$, then triangle AOB is congruent to triangle DOC by

a. ASA
b. SAS
c. SSS
*d. SAA
e. HL

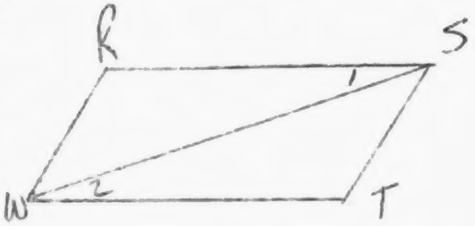
THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO ANALYZE A PROOF BY CHOOSING WHICH STATEMENTS ARE NECESSARY IN ORDER TO PROVE A GIVEN QUADRILATERAL IS A PARALLELOGRAM. 0683

By using what combination of the following statements can you prove that quadrilateral ABCD is a parallelogram? 2601

1. $\overline{AB} \cong \overline{CD}$
2. $\angle A \cong \angle C$
3. $\overline{BC} \parallel \overline{AD}$
4. $\angle B \cong \angle D$

a. Statements 1 and 2
b. Statements 1 and 3
c. Statements 2 and 4
d. Statements 4 and 1
*e. None of the above

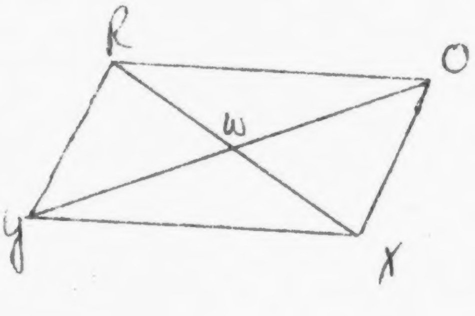
With which combination of the following statements can you prove that quadrilateral RSTW is a parallelogram? 2602



1. $\overline{RS} \cong \overline{WT}$
2. $\overline{RW} \cong \overline{ST}$
3. $\angle 1 \cong \angle 2$
4. $\angle R \cong \angle T$

a. Statements 1 and 4
b. Statements 2 and 4
*c. Statements 1 and 3
d. None of the above

With what combination of the following statements can you prove that quadrilateral ROXY is a parallelogram. 2603



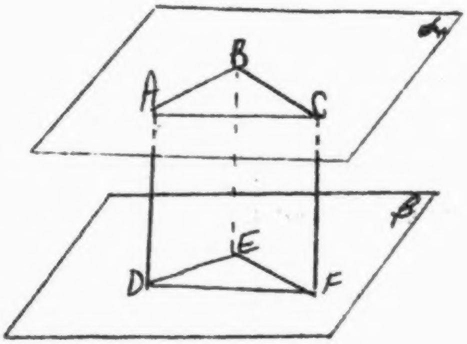
1. $\overline{RW} \cong \overline{WX}$
2. $\overline{OX} \cong \overline{RY}$
3. $\overline{RO} \cong \overline{XY}$
4. $\overline{WY} \cong \overline{WO}$

a. Statements 1 and 2
b. Statements 2 and 3
c. Statements 3 and 4
*d. Statements 2 and 4
e. None of the above

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO ANALYZE GEOMETRIC PROOFS BY DETERMINING WHAT CAN BE PROVED. 0700

If $\overline{AD} \perp \alpha$, $\overline{CF} \perp \beta$ 2661
$\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$
which of the following statements can be proved?

a. $\alpha \parallel \beta$
b. $\triangle ABC \cong \triangle DEF$
c. $\overline{AD} \perp \beta$
d. all of the above
*e. none of the above



If $\overline{AD} \perp \alpha$, $\overline{CF} \perp \alpha$ 2662
$\overline{AD} \cong \overline{CF}$, which of the following statements can be proved?

a. $\alpha \parallel \beta$
*b. $\overline{AD} \parallel \overline{CF}$
c. $m\angle BAC \cong m\angle EDF$
d. all of above
e. none of above

If $\alpha \parallel \beta$, $\overline{AD} \perp \beta$ 2663
$\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, which of the following statements can be proved?

a. $m\angle BAD = m\angle ADF$
b. $\overline{AD} \perp \alpha$
c. $\triangle ABC \cong \triangle DEF$
*d. all of the above
e. none of the above

THE STUDENT CAN ANALYZE PROOFS TO SELECT CONDITIONS THAT DETERMINE SIMILAR TRIANGLES. 0709

In $\triangle$s ABC and DEF, if $\angle A \cong \angle D$ then what additional information is needed to prove the triangles similar? 2749

a. $AB = DE$
*b. $\frac{AB}{DE} = \frac{AC}{DF}$
c. $\angle B \cong \angle D$
d. $\angle C \cong \angle D$

In $\triangle$s ABC and DEF, if $AB = 16$, $BC = 9$, $DE = 20$, then what is EF if $\triangle ABC$ is to be similar to $\triangle DEF$? 2750

a. 13
b. 7 1/5
*c. 11 1/4
d. 25

How many pairs of $\sim \triangle$s are formed by the diagonals and sides of a trapezoid? 2751

a. 1 pair
*b. 2 pair
c. 4 pair
d. none

If ABCD is a trapezoid with $AB \parallel CD$ and AC and BD intersect at E, then which of the following is not necessarily true? 2752

a. $\triangle DEA \sim \triangle CEB$
b. $\angle DAC \cong \angle CBD$
c. $\triangle DEC \sim \triangle BEA$
*d. $\frac{AD}{BC} = \frac{AC}{BD}$

THE STUDENT CAN ANALYZE PROOFS BY INDICATING CONDITIONS THAT ARE SUFFICIENT TO DETERMINE THE PERPENDICULAR BISECTOR OF A SEGMENT. 0710

If $\overline{AB}$ intersects $\overline{CD}$ at E and AC = AD, which of the following conditions would be sufficient to prove that $\overline{AB}$ is the perpendicular bisector of $\overline{CD}$? 2753

*a. $\angle BCD = \angle BDC$
b. AE = EB
c. $\angle ADB$ is a right angle
d. $\overline{CD}$ bisects $\angle ADE$

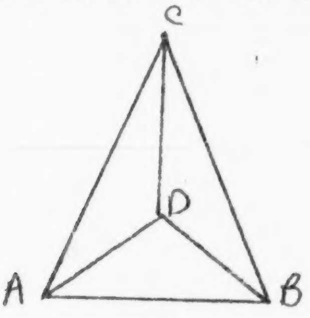
In quadrilateral ABCD, AB = 4, BC = 6, CD = 6 and AD = 4. Then 2754

a. $\overline{DB}$ bisects $\angle ADC$
b. $\overline{AC} \cong \overline{BC}$
*c. $\overline{AC} \perp \overline{DB}$
d. $\triangle ADB$ is an equilateral triangle

If plane m $\cap$ $\overline{AB}$ = C, D and E are in plane m, DA = DB and EA = EB, then what additional information is needed to conclude that plane m is the perpendicular bisector of $\overline{AB}$? 2755

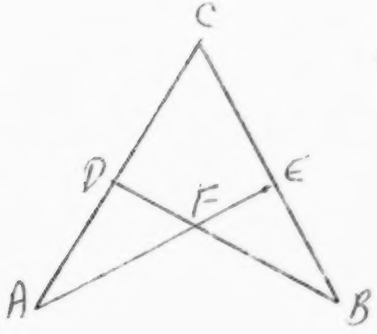
a. no additional information is needed
b. $\overline{AC} \perp \overline{CD}$
c. E, C, and D are collinear
*d. E, C, and D are non-collinear

THE STUDENT CAN ANALYZE GEOMETRIC PROOFS TO SELECT FACTS WHICH ARE ESSENTIAL TO AN ARGUMENT IN SUPPORT OF A CONCLUSION. 0714



In the figure = DB = DC, which of the following would be sufficient to prove that $\overleftrightarrow{CD}$ bisects $\overleftrightarrow{AB}$? 2773

a. AC = CD
b. $\triangle ABC$ is isosceles
c. $\triangle ABD$ is equilateral
*d. $\angle DAC \cong \angle DBC$



In the figure, D and E are midpoints of $\overline{AC}$ and $\overline{BC}$ respectively, What additional information would be needed to show that $\angle A \cong \angle B$? 2774

a. DF = FE
b. AF = FB
*c. CD = CE
d. AE = BD

In Quadrilateral ABCD, if the bisectors of $\angle DAB$ and $\angle DCB$ are parallel, which of the following would be sufficient to prove that ABCD is a parallelogram? 2775

*a. $\overline{AB} \parallel \overline{CD}$
b. $\angle D \cong \angle B$
c. AB = DC
d. AD = BC

If ABCD is a rhombus then which of the following would be sufficient to prove ABCD is a square? 2776

a. AB = AC
*b. AC = BD
c. AD = BD
d. CB = CA

THE STUDENT WILL BE ABLE TO ANALYZE A GIVEN STATEMENT BY CHOOSING A LOGICAL CONCLUSION. 0166

Directions: In the following items, find the only conclusion that is based on the given information.

Tom is older than Joe, and Jack is older than Joe. 0546

a. Jack is older than Tom.
b. Jack is younger than Tom.
c. Tom is older than Jack and Joe.
*d. none of the above

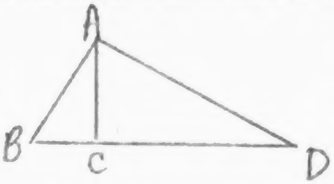
All students that received "A" on the test, studied for the test. 0547

a. John studied; therefore he received an "A".
*b. Bob received an "A" because he studied.
c. Pete received a "D" because he did not study.
d. a and b
e. none of the above

Vertical angles are equal. 0548

a. $\angle 1 = \angle 2$. $\angle 1$ and $\angle 2$ are vertical $\angle$s.
b. All right $\angle$s are equal. All right $\angle$s are vertical.
*c. $\angle 3$ and $\angle 4$ are vertical $\angle$s. $\angle 3 = \angle 4$.
d. $\angle 5$ and $\angle 6$ are not vertical $\angle$s. $\angle 5$ and $\angle 6$ are not equal.
e. a and b

THE STUDENT WILL BE ABLE TO APPLY THE RULES OF LOGIC IN PROOF OF A STATEMENT BY CHOOSING STATEMENTS NECESSARY FOR A GIVEN PROOF. 0258



Given: $\overline{AC} \perp \overline{BD}$, $BC \neq CD$
Prove: $AB \neq AD$

Which of the following will most logically help you to solve this problem? 0960

a. If $\angle B = \angle D$, then $AB = AD$
b. If $BC \neq CD$, then $\underline{m\angle} B \neq m\angle D$
c. If $BC = CD$, then $\overline{AC}$ is the perpendicular bisector of $\overline{BD}$
*d. If $AB = AD$, then $\angle B \cong \angle D$
e. If $BC = CD$, then $\triangle BCA \cong \triangle DCA$

A) Jean Green does not like but blond men
B) All blonds sunburn easily
C) Bill Brill stayed at the beach for eight hours
D) If a blond stays at the beach over four hours, he will be painfully sunburnt.
E) Bill Brill likes Jean Green and wonders if she likes him.
F) Bill Brill feels fine

What one statement above could be omitted leaving the remainder to show without redundancy that Jean and Bill and Jean might be compatible. 0961

- a. a
- *b. b
- c. c
- d. d
- e. e
- f. f

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF LOGICALLY EQUIVALENT STATEMENTS BY SELECTING A STATEMENT WHICH IS LOGICALLY EQUIVALENT TO A GIVEN STATEMENT. 0508

Consider the statement "$p \Rightarrow q$ and $q \Rightarrow p$." A logically equivalent statement is: 1884

- *a. p if and only if q.
- b. $p \Rightarrow q$ if $q \Rightarrow p$.
- c. $p \Rightarrow q$ only if $q \Rightarrow p$.
- d. $p \Rightarrow q$ only if $q \Rightarrow p$.
- e. none of these

Given that p and q are statements and the statement $p \Rightarrow q$ is true. Then, which of the following statements is necessarily true? 1885

- a. $q \Rightarrow p$
- b. not $p \Rightarrow$ not q
- *c. not $q \Rightarrow$ not p
- d. none of these

THE STUDENT CAN DEMONSTRATE A KNOWLEDGE OF THE BASIC TERMS OF BEGINNING LOGIC BY INDICATING CORRECT CONCLUSIONS, CONVERSES, ETC. 0738

In the statement "If two sides of a triangle are congruent, then the angles opposite the sides are congruent", the hypothesis of the statement is 3055

- *a. two sides of a triangle are congruent
- b. the angles opposite the sides are congruent
- c. two sides of a triangle
- d. the sides are congruent

The conclusion in the statement "The medians of a triangle are concurrent" is 3056

a. the medians of a triangle
*b. the medians are concurrent
c. a triangle
d. the medians

The converse of the statement "The diagonals of a parallelogram bisect each other" is 3057

a. the diagonals of a parallelogram do not bisect each other.
b. If the diagonals of a quadrilateral do not bisect each other, then the quadrilateral is not a parallelogram.
*c. If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.
d. If a quadrilateral is not a parallelogram then, its diagonals do not bisect each other.

The inverse of the statement "If p then q" is 3058

a. p only if q
b. q only if p
*c. If not p, then not q
d. If q then p

The contrapositive of the statement"If two sides of a triangle are congruent, then the opposite angles are congruent" is 3059

a. If two sides of a triangle are not congruent, then the opposite angles are not congruent.
b. If two angles of a triangle are congruent, then the opposite sides are congruent.
c. If two sides of a triangle are congruent, then the opposite angles are not congruent.
*d. If two angles of a triangle are not congruent, then the opposite sides are not congruent.

The statement "Studying very little is a sufficient condition for getting an F" is logically equivalent to 3060

a. If you study hard, then you will get an A.
b. If you get an F, then you have studied very little.
*c. If you study very little, then you will get an F.
d. If you study hard, then you will not get an F.

If the statement "all men are intelligent" is true, then which of the following is necessarily true? 3061

a. Women are dumb.
b. If you are intelligent, then you are a man.
*c. If you are not intelligent, then you are not a man.
d. Some men are not intelligent.

If the statement "Beautiful women are dumb" is true then which of the following is necessarily true? 3062

a. Some women are dumb.
b. Some women are not dumb.
c. If you are dumb, then you are a beautiful woman.
*d. If you are not dumb, then you are not a beautiful woman.

If the statement "If you are dishonest, then you are unhappy" is true, then which of the following statements are necessarily true? 3063

a. Honest people are happy.
b. If you are unhappy, then you are dishonest.
*c. If you are happy, then you are honest.
d. Some honest people are unhappy.

The statement"a necessary condition for two lines to be parallel is that they be coplanar" is logically equivalent to 3064

a. Two coplanar lines are parallel
*b. Two lines that are not coplanar are not parallel
c. Two lines that are not parallel are not coplanar
d. If two lines intersect then they are not coplanar

The statement " a necessary condition for a quadrilateral to be a square is that its sides are all congruent" is logically equivalent to 3065

*a. If a quadrilateral is a square, then all of its sides are congruent.
b. If the sides of a quadrilateral are all congruent, then it is a square.
c. If a quadrilateral is not a square, then its sides are not all congruent.
d. All quadrilaterals are squares.

The inverse of the statement "all equilateral triangles are isosceles" is 3066

a. There is at least one equilateral triangle which is not isosceles.
*b. If a triangle is not equilateral, then it is not isosceles.
c. Some isosceles triangles are equilateral.
d. All isosceles triangles are equilateral.

The contrapositive of the statement "all equilateral triangles are isosceles" is 3067

*a. If a triangle is not isosceles, then it is not equilateral.
b. If a triangle is isosceles, then it is equilateral.
c. If a triangle is not equilateral, then it is not isosceles.
d. If a triangle is not equilateral, then it is isosceles.

The converse of the statement "all equilateral triangles are isosceles" is 3068

a. Some isosceles triangles are equilateral.
b. If a triangle is not equilateral, then it is not isosceles.
c. If a triangle is not isosceles, then it is not equilateral.
*d. If a triangle is isosceles, then it is equilateral.

In order to prove the statement "all equilateral triangles are isosceles" is false it is sufficient to show 3069

a. There is at least one isosceles triangle which is not equilateral.
b. Some equilateral triangles are isosceles.
*c. There is at least one equilateral triangle which is not isosceles.
d. Isosceles triangles are equilateral.

To prove that "If a triangle is scalene, then its angles have different measures" it is sufficient to show 3070

*a. If two angles of a triangle are congruent, then the triangle is not scalene.
b. If two angles of a triangle are not congruent, then the opposite sides are not congruent.
c. An equilateral triangle is equiangular.
d. An equiangular triangle is equilateral.

To show that "there is at least one line perpendicular to a given line from a point not on the given line" is false it is sufficient to show that 3071

a. there cannot be two different perpendiculars from a point to a line.
*b. there are no perpendiculars from a point to a line.
c. there are no more than two perpendiculars from a point to a line.
d. there is only one perpendicular from a point to a line.

If the statement "an angle has one and only one bisector" is true, then which of the following is not necessarily true? 3072

a. an angle has at least one bisector
b. an angle has at most one bisector
c. an angle has at most two bisectors
*d. an angle has at least two bisectors

3073

"Jim and John are boys.
Jim and John are intelligent.
all boys are intelligent" is an example of

- a. Deductive reasoning
- b. Indirect reasoning
- *c. Inductive reasoning
- d. Modus ponens

3074

"Rainy days are gloomy days.
Today is a rainy day.
Today is a gloomy day" is an example of

- a. Inductive reasoning
- *b. Deductive reasoning
- c. Indirect proof
- d. Modus ponens

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF TYPES OF REASONING BY CLASSIFYING A STATEMENT AS ONE OF THE TYPES. 0655

The following statement "John is a great baseball player, so his son will be a great baseball player" is an example of 2519

- *a. reasoning by analogy
- b. inductive reasoning
- c. deductive reasoning

The following statement "Rover loves strawberries. Rover is a dog. Therefore, all dogs love strawberries" is an example of 2520

- a. reasoning by analogy
- *b. inductive reasoning
- c. deductive reasoning

The following statements "All boys chew gum. George is a boy. Therefore George chews gum" is an example of 2521

a. reasoning by analogy
b. inductive reasoning
*c. deductive reasoning

The following statement "Einstein, a genius, was color-bling. Joe W. Zinger is color-blind. Therefore Joe W. Zinger will be a genius" is an example of 2522

*a. reasoning by analogy
b. inductive reasoning
c. deductive reasoning

The following statements "Larry who is a student at Hinsdale Central, is a tremendous fullback. Sally is a student at Hinsdale Central. Therefore, Sally is a tremendous fullback" is an example of 2523

a. reasoning by analogy
*b. inductive reasoning
c. deductive reasoning

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO ANALYZE THREE STATEMENTS BY DETERMINING WHETHER THE CONCLUSION IS OR IS NOT VALID AND STATE WHY IT IS NOT VALID. 0656

1. All cows have four legs.
2. My dog Rover has four legs.
3. Therefore, my dog Rover is a cow.

The conclusion is

a. valid
b. not valid, because statement number 1 is false
c. not valid, because statement number 2 is false
*d. not valid, because the reasoning is false
e. b and d

1. All Texans are tall. 2525
2. Henry is a Texan.
3. Therefore Henry is tall.

The conclusion is

a. valid
*b. not valid, because statement number 1 is false
c. not valid, because statement number 2 is false
d. not valid, because the reasoning is false
e. b and d

1. All students in this school will receive straight 5's. 2526
2. Barb receives straight 5's.
3. Barb is a student in this school.

The conclusion is

a. valid
b. not valid, because statement number 1 is false
c. not valid, because statement number 2 is false
d. not valid, because the reasoning is false
*e. b and d

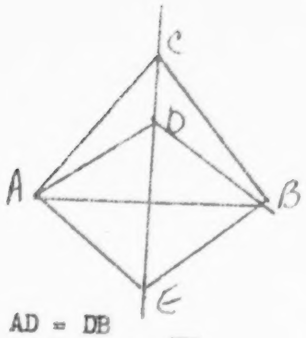
THE STUDENT CAN ANALYZE SITUATIONS TO DETERMINE CONCLUSIONS BASED ON THE PERPENDICULAR BISECTORS OF LINE SEGMENTS. 0711

If $\overleftrightarrow{AB}$ is the perpendicular bisector of $\overline{CD}$ and $\overline{AB} \cap \overline{CD} = E$, then 2756

a. $AE = EB$
b. $AC = BC$
*c. $AC = AD$
d. $BD = AD$

If Plane Q is the perpendicular bisector of $\overline{XY}$, W is the mid-point of $\overline{XY}$, S and T are any two points in plane Q, then 2757

a. $\overline{SW} \perp \overline{WT}$
*b. $\angle TXY \cong \angle TYX$
c. $XS = XT$
d. W, T, S, and X are coplanar



In the figure, if AC = 5, BC = 5, $\overline{AE}$ = 6, BE = 6, D is on $\overleftrightarrow{CE}$, and $\overline{CE}$ intersects $\overline{AB}$, then which of the following is not necessarily true? 2758

a. AD = DB
b. CE bisects $\overline{AB}$
*c. AEBC is a parallelgram
d. $\overleftrightarrow{CE} \perp \overline{AB}$

If $\overline{AB}$ is a segment, which of the following determine a plane which is the perpendicular bisector of $\overline{AB}$? 2759

*a. Three noncollinear points each equidistant from the end points of $\overline{AB}$.
b. A line perpendicular to $\overline{AB}$ at its midpoint.
c. Points C and D where AC = BC = AD = BD.
d. Two intersecting lines each perpendicular to $\overline{AB}$.

THE STUDENT WILL BE ABLE TO CHOOSE THE REASON FOR A MISTAKE IN DEDUCTIVE THINKING IN ANALYZING INCORRECT DEDUCTIONS. 0198

All cows have four legs.
My dog Rover has four legs. 0716
Therefore my dog is a cow.

The conclusion is:

a. false because the major premise is false.
b. false because the minor premise is false.
*c. false because the reasoning is incorrect.
d. true.

All good football teams have winning records.
The Chicago Bears have a winning record. 0717
Therefore the Chicago Bears are a good football team.

The conclusion is:

a. false because the major premise is false.
b. false because the minor premise is false.
*c. false because the reasoning is incorrect.
d. true.

All Texans are tall. 0718
George is a Texan.
Therefore George is tall.

The conclusion is:

- *a. false because the major premise is false.
- b. false because the minor premise is false.
- c. false because the reasoning is incorrect.
- d. true.

THE STUDENT WILL BE ABLE TO DISTINGUISH BETWEEN INDUCTIVE AND DEDUCTIVE THINKING BY CHOOSING THE CORRECT DESCRIPTION FOR A GIVEN ILLUSTRATION. 0199

The following passage "Mary bought a dress at Sears for $10.00. The same dress at Penny's cost $12.00. Therefore all items at Penny's cost more than Sears" is an example of 0719

- *a. inductive reasoning
- b. deductive reasoning
- c. both of the above
- d. none of the above

The following passage "Mary is a woman. Mary is a careless driver. Therefore all women are careless drivers" is an example of 0720

- *a. inductive reasoning
- b. deductive reasoning
- c. combination of both
- d. none of above

THE STUDENT WILL BE ABLE TO ANALYZE GEOMETRIC STATEMENTS BY INDICATING THEIR IMPORTANCE IN TESTING CERTAIN HYPOTHESES GIVEN A SET OF PROPOSALS. 0265

You believe that the distance between parallel lines is constant. Which of the following would best start you in proving this. 1005

a. State that since parallel lines never meet, the distance between them cannot be smaller or larger than at a given place.
b. Construct any two lines l_1 and l_2 which intersect both of the parallel lines.
c. Construct any two parallel lines which intersect the given parallel lines.
*d. Construct perpendiculars to one of the parallel lines at any two points.
e. none of the above

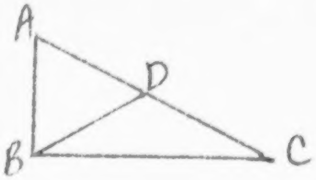
You believe that the perpendicular bisectors of the sides of a triangle are concurrent. To verify this belief, you might first construct these perpendicular bisectors and then most easily use 1006

a. coordinate geometry to show that they have a point in common.
b. the circumscribed circle to show that its center is the intersection of these lines.
c. the inscribed circle to show that its center is the intersection of these lines.
d. the midpoint definition.
e. the Perpendicular Bisector Definition.
*f. the Perpendicular Bisector Theorem.

Which of the following can best be used to prove that an equilateral triangle can be subdivided into three congruent non-overlapping triangular regions. 1007

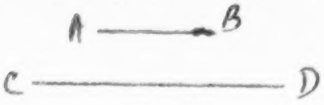
a. any altitude of the triangle
*b. an inscribed circle
c. a 30-60 Right Triangle
d. the trisection of one side
e. none of the above

Given that $\overline{BD}$ is a median of ABC and $BD = \frac{1}{2}AC$, which of the following would be least helpful to you in proving your hypothesis that ABC is right triangle. 1008



- *a. The Pythagorean Theorem
- b. The Circumscribed Circle
- c. The isosceles triangles
- d. The intersection of the perpendicular bisectors of the side.

There is a one-one correspondence between the sets of points of any two segments. It doesn't look that way, but how would you describe this correspondence between $\overline{AB}$ and $\overline{CD}$? 1009



- a. $CD = 2AB$, so let every set of two points on $\overline{CD}$ correspond to a point on $\overline{AB}$.
- b. Let A and C, B and D correspond and then associate their midpoints, then midpoint of new half-segments, etc.
- *c. Use the idea of a pendulum swinging through the point of intersection of AC and BD.
- d. None of the above will work.

You wish to prove that a ray, QT, in the plane of a circle, with its end point Q in the interior of the circle must intersect the circle in exactly one point. To prove existence, you find a point on the ray at a distance of 2r from Q. Then you use 1010

- a. the equation of a circle.
- b. the Distance Formula
- c. The Pythagorean Theorem.
- *d. the Triangle Inequality
- e. nothing, because it cannot be proven

THE STUDENT DEMONSTRATES HIS ABILITY TO ANALYZE A PROBLEM BY INDICATING WHEN HE HAS NECESSARY AND SUFFICIENT DATA NECESSARY FOR SOLUTION. 0273

Consider the following statements.

- a. There is a collection of dimes and nickels whose total is $2.00
- b. There are twice as many nickels as dimes.

To find the number of dimes in the collection ________. 1342

- *a. both statements A and B are needed
- b. only statement A is needed
- c. only statement B is needed
- d. more information is needed

Consider the statement, how much pure acid must be added to a solution of 14% acid? To find the amount of pure acid to be added, there is ________. 1343

- a. sufficient and necessary information
- b. sufficient but some unnecessary information
- *c. there is necessary but sufficient information

THE STUDENT CAN SHOW HIS KNOWLEDGE OF AUXILIARY LINES BY NAMING THEM AND DETERMINING HOW MANY ARE NECESSARY IN A PARTICULAR SITUATION. 0579

A line introduced into a figure to assist with the proof, but not mentioned in the theorem or in the given or proof statements, is called a(n)_____. 2073

- a. perpendicular line
- b. angle bisector
- c. bisecting line
- *d. auxiliary line

In the proof of the theorem "there is at least one line perpendicular to a given line through a given point on the line" the least number of auxiliary lines needed is ______. 2074

a. none
b. one
c. two
*d. three
e. more than three

In the proof of the theorem "If two distinct points are each equidistant from the end points of a segment, they determine the perpendicular bisector of the segment". How many auxiliary lines are necessary? 2075

a. 0
b. 1
c. 2
d. 3
*e. 4

THE STUDENT CAN ANALYZE CONDITIONS WHICH DETERMINE THE EXISTENCE AND UNIQUENESS OF GEOMETRIC FIGURES BY INDICATING THE SET OR CONDITION FOR A SPECIFIC SITUATION. 0727

Which of the following sets are unique? 2891

a. a line containing point A
*b. the bisector of $\angle ABC$
c. a line which is the perpendicular bisector of $\overline{AB}$
d. a line from A to $\overleftrightarrow{BC}$

Which of the following sets always exist? 2892

a. a circle containing four non coplanar points
b. a circle with center A which contains points B and C
c. a circle containing the vertices of a quadilateral
*d. a circle tangent to $\overleftrightarrow{AB}$ and containing C where C is not on $\overleftrightarrow{AB}$

Which of the following conditions determine a $\triangle ABC$? 2893

a. $m \angle A = 50^\circ$, $m \angle B = 60^\circ$, $m \angle C = 70^\circ$
b. $AC = 6$, $BC = 5$, $m \angle A = 20^\circ$
*c. $AB = 10$, $m \angle C = 90^\circ$, $AC = 4$
d. $\odot O$ is the inscribed circle of $\triangle ABC$

Which of the following statements implies the existence of a non-empty set? 2894

*a. there is at least one perpendicular from A to $\overleftrightarrow{BC}$
b. there is at most one perpendicular from A to $\overleftrightarrow{BC}$
c. there are no more than two perpendiculars from A to $\overleftrightarrow{BC}$
d. there is at most one line containing A which is parallel to BC

Which of the following sets always exist? 2895

a. a circle inscribed in a rectangle
*b. a circle inscribed in a rhombus
c. a circle inscribed in a trapezoid
d. a circle inscribed in a parallelogram

Which of the following statements is true? 2896

a. there is one and only one line perpendicular to a given line through a given point on the line
b. there is one and only one plane which is perpendicular to a given plane M at a given point in plane M
*c. there is one and only one line perpendicular to $\overleftrightarrow{AB}$ from a point C which is not on $\overleftrightarrow{AB}$
d. one and only one circle contains two given points

Which of the following statements are true? 2897

a. three distinct points determine a plane
b. three distinct points determine a circle
*c. three non-collinear points determine a triangle
d. two straight lines determine a plane

Which of the following sets do not necessarily exist? 2898

a. a circle that contains the vertices of a given triangle
b. a circle that contains the vertices of a given square
c. a circle that contains the vertices of a given rectangle
*d. a circle that contains the vertices of a given trapezoid

Which of the following is true? 2899

*a. two skew lines have one and only one common perpendicular line
b. there is a plane perpendicular to each of two skew lines
c. a line parallel to one of two skew lines intersects the other
d. a line parallel to one of two skew lines is parallel to the other

Which of the following sets do not determine a plane?

a. a triangle
b. an angle
c. parallel lines
*d. three points

THE STUDENT WILL SHOW HIS KNOWLEDGE OF CONVERSE AND CONTRAPOSITIVE BY IDENTIFYING THE RELATIONSHIP BETWEEN TWO STATEMENTS OR A STATEMENT GIVEN THE RELATIONSHIP AND ANOTHER STATEMENT. 0582

Given the statement $r \Rightarrow s$, the statement not $s \Rightarrow r$ is called the ______ of the first statement. 2080

a. converse
b. hypothesis
c. inverse
*d. contrapositive

If a given statement is true, then its contrapositive is ______. 2081

*a. always true
b. sometimes true
c. never true

Given the statement $a \Rightarrow b$, then the converse of the contrapositive of this statement is ______. 2082

a. $a \Rightarrow b$
b. $\sim b \Rightarrow \tilde{a}$
*c. $\sim a \Rightarrow \sim b$
d. $b \Rightarrow a$

Given a statement $x \Rightarrow y$ and we define INVERSE of $x \Rightarrow y$ as $\sim x \Rightarrow \sim y$, then the inverse of a statement is the ______ of the statement. 2083

a. converse of the converse
b. contrapositive of the contrapositive
*c. converse of the contrapositive
d. converse of the converse of the contrapositive

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF CONVERSES BY FINDING THE CONVERSE OF A GIVEN STATEMENT. 0673

The converse of "If two angles are right angles, then they are congruent" is 2576

*a. If two angles are congruent, then they are right angles.
b. If two angles are not right angles, then they are not congruent.
c. If two angles are not congruent, then they are not right angles.
d. If two angles are right angles, then they are not congruent.

The converse of "If it is raining, visibility is poor" is 2577

*a. If visibility is poor, then it is raining.
b. If it is not raining, visibility is not poor.
c. If visibility is not poor, then it is not raining.
d. If it is raining, then visibility is not poor.

THE STUDENT CAN DEMONSTRATE HIS ABILITY TO RECALL THE THEORIES OF CONTRAPOSITIVES, AND CONVERSES BY DETERMINING THE RELATIONSHIP BETWEEN THEM AND A TRUE OR FALSE STATEMENT. 0671

"If a statement is true, its contrapositive is 2569

*a. Always true
b. Sometimes true
c. Never true

"If a statement is true, its converse is 2570

a. Always true
*b. Sometimes true
c. Never true

If a statement is false, its contrapositive is 2571

a. Always true
b. Sometimes true
*c. Never true

If a statement is false, its converse is 2572

a. Always true
*b. Sometimes true
c. Never true

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF CONTRAPOSITIVES BY CHOOSING THE CONTRAPOSITIVE FROM A LIST OF STATEMENTS. 0672

The contrapositive of "If a triangle is equiangular, then it is equilateral." is 2573

a. If a triangle is equilateral then it is equiangular.
b. If a triangle is not equiangular, then it is not equilateral.
*c. If a triangle is not equilateral then it is not equiangular.
d. If a triangle is not equiangular then it is equilateral.

The contrapositive of "If you can operate a car, you can fly a plane" is 2574

- a. If you can fly a plane, then you can operate a car.
- b. If you can not operate a car, you can not fly a plane.
- *c. If you can not fly a plane, then you can not drive a car.
- d. If you can not drive a car, then you can fly a plane.

The contrapositive of "If a girl has studied home economics, then she is a good cook". 2575

- a. If a girl is a good cook then she has studied home economics.
- b. If a girl has not studied home economics, then she is not a good cook.
- *c. If a girl is not a good cook then she has not studied home economics.
- d. If a girl has not studied home economics, then she is a good cook.

THE STUDENT WILL RECALL THE PARALLEL POSTULATE BY CLASSIFYING THE STATEMENT AS A POSTULATE. 0581

The statement "There is one and only one line parallel to a given line and containing a given point not on that line is a ______. 2079

- a. theorem
- *b. postulate
- c. corollary
- d. definition

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECALL THE FIRST FIVE POSTULATES BY COMPUTING THE NUMBER OF LINES GIVEN A CERTAIN AMOUNT OF POINTS. 0645

The maximum amount of lines that are determined by any four points, no three of which are collinear is 2493

a. 1 line
b. 2 lines
c. 4 lines
*d. 6 lines
e. none of the above

The maximum amount of lines determined by 4 points (three of which are collinear is 2494

a. 1 line
b. 2 lines
*c. 4 lines
d. 6 lines
e. none of the above

THE STUDENT RECALLS THE MEANING AND IMPLICATIONS OF BASIC TERMS AND POSTULATES IN INTRODUCTORY GEOMETRY BY INDICATING THE TERM OR POSTULATE FOR A GIVEN SITUATION. 0702

If a ray is drawn from a point on a straight line and the ray is not on the line, then the angles formed are 2667

a. right angles
b. acute angles
c. obtuse angles
d. complementary angles
*e. supplementary angles

If $m(\angle A) = 29^\circ$ and $m(\angle B) = 61^\circ$ then $\angle A$ and $\angle B$ are 2668

a. supplementary angles
b. vertical angles
*c. complementary angles
d. obtuse angles
e. congruent

If A, B, and C are points in a plane and $AB = 3$, $BC = 8$ and $CA = 4$ then 2669

a. A is between B and C
b. C is between A and B
c. B is between A and C
*d. A, B, and C are non- collinear

If a ray and an angle intersect, the intersection may be 2670

a. a line
b. three points
*c. a ray
d. four non-coplanar points

Which of the following sets of points are not necessarily coplanar? 2671

a. three points
b. two intersecting lines
c. a triangle
*d. two straight lines
e. a straight line and a point

A postulate is a statement which 2672

a. is true
*b. is accepted without proof
c. is proved
d. can be proven false

If A, B, C and D are distinct points and $\overleftrightarrow{AB} = \overleftrightarrow{CD}$ then 2673

a. $\overrightarrow{AB} = \overrightarrow{CD}$
b. $AB = CD$
c. $\overline{AB} \cap \overline{CD} = \emptyset$
*d. one of the points is between two of the other points

If C is the mid-point of $\overline{AB}$ then 2674

a. AB = BC
b. AC = AB
*c. C is between A and B
d. $\overline{AC} \cup \overline{AB} = \overline{BC}$

A plane is determined by 2675

a. two points
b. three points
c. a point and a line
d. two lines
*e. perpendicular lines

The intersection of the interiors of two angles of a triangle is 2676

a. a segment
b. a point
*c. the interior of a triangle
d. a ray

Which of the following sets of points is convex? 2677

a. three non-collinear points
b. a triangle
c. an angle
*d. a segment

The interior of an angle of a triangle is 2678

a. a subset of the interior of the triangle
*b. a set formed by the intersection of two half planes
c. a segment
d. the union of two rays

If $\overrightarrow{AB}$, $\overrightarrow{AC}$ and $\overrightarrow{AD}$ are three distinct rays then 2679

a. A, B, C and D are coplanar
*b. $\overrightarrow{AB}$, $\overrightarrow{AC}$ and $\overleftrightarrow{AD}$ are concurrent
c. C is between B and D
d. BAC is acute

If $\overrightarrow{AB}$, $\overrightarrow{AC}$ and $\overrightarrow{AD}$ are three distinct coplanar rays and C is in the interior of BAD, then 2680

a. $\angle BAC \cong \angle BAD$
*b. $M\angle CAB + M\angle CAD = M\angle BAD$
c. $\angle CAB$ is a right angle
d. $\overline{CD}$ is contained in the interior of $\angle BAD$

If two angles are complementary then 2681

*a. both angles are acute
b. one angle may be obtuse
c. the union of the angles is a right angle
d. the angles have the same vertex

If $\angle BAC$ and $\angle DAE$ are vertical angles which of the following is not necessarily true? 2682

a. they have the same vertex
b. they are coplanar
c. A, B, and C are non-collinear
*d. they are acute angles

If the intersection of two different planes contains distinct points A, B, and C then 2683

a. B is between A and C
*b. A, B, and C are collinear
c. AB and $\overline{BA}$ are opposite rays
d. AB + BC = AC

The measure of $\angle A$ is 30 less than twice the measure of its supplement, then 2684

a. $\angle A$ a right angle
*b. $\angle A$ is an obtuse angle
c. $M(\angle A) = 50$
d. $\angle A$ is an acute angle

If points A and B are in the exterior of $\angle CDE$ then $\overline{AB} \cap \angle CDE$ may be 2685

a. $\overline{AB}$
b. three points
*c. two points
d. $\overrightarrow{CD}$

If $\overline{AD}$ is a median of $\triangle ABC$ then 2686

a. $AB = AC$
b. $\overline{AD} \perp \overline{BC}$
*c. $BD = CD$
d. $\angle DAB \cong \angle DAC$
e. $\overline{AD}$ is a subset of the interior of $\angle BAC$

If $\overline{BD}$ is an angle bisector of $\triangle ABC$ then 2687

a. $\overline{BD} \perp \overline{AC}$
b. D is the mid-point of $\overline{AC}$
c. $\angle A \cong \angle C$
*d. $\angle DBA = \angle DBC$

In $\triangle ABC$, if $AC = 10$ inches and $BC = 10$ inches, then ABC is 2688

a. a right triangle
b. an equilateral triangle
c. an acute triangle
*d. an isosceles triangle

The supplement of an angle of 70° contains 2689

a. 20°

b. 70°

*c. 110°

d. 30°

If an acute angle increases, then its complement 2690

a. increases
*b. decreases
c. remains the same
d. fluctuates

If the measure of an angle is twice the measure of its supplement then the measure of the angle (in degrees) is 2691

a. 60
b. 30
c. 150
*d. 120

The difference between the measures of the supplement and the complement of an angle is 2692

a. 45°

b. 60°

*c. 90°

d. undetermined

THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF THE AXIOMS OF REAL NUMBERS BY SELECTING THE AXIOM THAT IS ILLUSTRATED BY TRUE STATEMENTS. 0621

Name the axiom of real numbers that is illustrated by $15 + 13 = 13 + 15$. 2211

a. associative
*b. commutative
c. closure
d. symmetric
e. transitive

Name the axiom of real numbers that is illustrated by "$3 \cdot 2$ is a real number." 2212

a. associative
b. commutative
*c. closure
d. symmetric
e. transitive

Name the axiom of real numbers that is illustrated by "$5 + (2+0) = (5+2) + 0$". 2213

*a. associative
b. commutative
c. closure
d. symmetric
e. transitive

Name the axiom of real numbers that is illustrated by "if $x \in R$ and $x + 4 = 0$, then $0 = x + 4$". 2214

a. associative
b. commutative
c. closure
*d. symmetric
e. transitive

Name the axiom of real numbers that is illustrated by "if $y \in R$, and if $y + 2 = 6 + 1$ and $6 + 1 = 7$, then $y + 2 = 7$." 2215

a. associative
b. commutative
c. closure
d. symmetric
*e. transitive

Name the axiom of real numbers that is illustrated by "$16 (7 + \frac{1}{2}) = 16 (7) + 16 (\frac{1}{2})$." 2216

a. associative
b. commutative
c. closure
*d. distributive
e. transitive

Name the axiom of real numbers that is illustrated by "$(2 + 9)x^2 = 11x^2$." 2217

a. associative
b. commutative
c. distributive
*d. substitution
e. transitive

Name the axiom of real numbers that is illustrated by "$5 + 7 = 5 + 7$". 2218

a. associative
b. commutative
c. distributive
*d. reflexive
e. transitive

Which of the following sets are closed under the operation named? 2219

a. $\{1, 2, 3\}$, addition
b. $\{\frac{1}{2}, 1, 2\}$, division
c. $\{0, 1, 2\}$, subtraction
*d. {The multiples of 5}, addition
e. {Natural numbers}, division

An operation * is defined over the set of natural numbers as $A*B=A-B$. Determine which of the closure, associative and/or commutative axioms hold for the set of natural numbers under *. 2220

a. closure, commutative
b. closure, associative
c. commutative, associative
d. all three hold
e. none hold

THE STUDENT CAN SHOW HIS UNDERSTANDING OF THE AXIOMS OF EQUALITY BY MATCHING GIVEN STATEMENTS WITH THE APPROPRIATE AXIOM. 0368

Directions: In the following questions, match each statement with one of the following choices.

a. reflexive
b. symmetric
c. transitive
d. substitution
e. none of these

d If $x = y + z$ and $x + k = m$, then $(y+z) + k = m$ 1482

a $x + y = x + y$ 1483

b If $x + y = z$, then $z = x + y$ 1484

e $(6 + 7) + 5 = 3 + (11 + 4)$ 1485

c If $2 + 3 = 5$ and $5 = 3 + 2$, then $2 + 3 = 3 + 2$ 1486

SEQUENCES, PROGRESSION AND SERIES

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE A SEQUENCE OF NUMBERS BY SELECTING THE MISSING NUMBERS IN THE SEQUENCE OR BY CONTINUING THE SEQUENCE. 0013

What is the missing number in the following sequence 1, 2, 5, __, 17? 1424

a. 9
*b. 10
c. 11
d. 12
e. 13

What is the missing number in the following sequence? 1925

$\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$, ___

a. $\frac{1}{135}$
b. $\frac{1}{120}$
c. $\frac{1}{729}$
d. $\frac{1}{216}$
*e. $\frac{1}{243}$

The open phrase which is the rule for the sequence 5, 8, 13, 20, 29 is 1426

*a. (n)(n) + 4
b. 3n + 2
c. (5n)(n)
d. 4n + 1

THE STUDENT WILL BE ABLE TO, GIVEN A SEQUENCE FORMULA, FIND ELEMENTS OF THE SEQUENCE AND, GIVEN ELEMENTS OF THE SEQUENCE, DERIVE ITS FORMULA, THUS DEMONSTRATING AN ABILITY TO ANALYZE A SEQUENCE. 0262

Directions: Match each of the following sequences with the formula for its n^{th} term by placing the letter of the correct sequence before the formula.

A. (4, 8, 12, 16...)

B. (a, 4, 9, 16...)

C. (6, 10, 15, 21...)

D. $(2, \sqrt{3}, \sqrt[3]{4}, \sqrt[4]{5}, \ldots)$

E. $(\frac{1}{3}, \frac{1}{6}, \frac{1}{12}, \frac{1}{24}, \ldots)$

F. $(\frac{1}{2}, \frac{2}{5}, \frac{3}{10}, \frac{4}{17}, \ldots)$

G. $(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots)$

H. $\frac{\sqrt{2}}{1}, \frac{\sqrt{3}}{2}, \frac{2}{3}, \frac{\sqrt{5}}{4}, \ldots$

I. (4, 9, 16, 25,...

J. $(1, \sqrt{2}, \sqrt[3]{3}, \sqrt[4]{4}, \ldots)$

K. $(\frac{1}{2}, \frac{\sqrt{2}}{3}, \frac{\sqrt{3}}{4}, \frac{2}{5}, \ldots)$

L. (5, 11, 17, 23,...)

M. (1, 2, 4, 8,...)

N. (2, 4, 8, 16,...)

I 1. $(n + 1)^2$ 0974

K 2. $\frac{\sqrt{n}}{n + 1}$ 0975

C 3. $\frac{(n + 2)(n + 3)}{2}$ 0976

F 4. $\frac{n}{n^2 + 1}$ 0977

L 5. $5 + 6(n - 1)$ 0978

A 6. $4n$ 0979

E 7. $\frac{1}{3(2^{n-1})}$ 0980

H 8. $\frac{\sqrt{n + 1}}{n}$ 0981

D 9. $\sqrt[n]{n + 1}$ 0982

M 10. 2^{n-1} 0983

$$a_n = \begin{cases} 0 \text{ if } n \text{ is even} \\ 2n \text{ if } n \text{ is odd} \end{cases}$$

The first six elements of the sequence are 0987

a. 2, 0, 4, 0, 8, 0
*b. 2, 0, 6, 0, 10, 0
c. 0, 2, 0, 4, 0, 6
d. 0, 4, 0, 8, 0, 10
e. none of the above

Which of the following does not represent a sequence from the set of counting into the set of rational numbers? 0988

a. $a_n = \frac{n + 1}{2}$
b. $a_n = n^2 + 3$
c. $a_n = \sqrt{n^4}$
d. $a_n = 3$
*e. none of the above

Which of the following does not represent a sequence into the set of counting numbers? 0989

a. $a_n = 2^{n - 1}$
b. $a_n = n^{n - 1}$
*c. $a_n = (n - 1)^n$
d. $a_n = 2^{2n - 1}$
e. none of the above

THE STUDENT CAN ANALYZE PATTERNS IN MATHEMATICS BY SELECTING SOLUTIONS TO PROBLEMS INVOLVING DIRECTED NUMBERS. 0319

If given that (5T), (1N,6T),(2N,7T), (3N, 8T) all represent the directed number -5, then +6 might be represented by 0844

a. (6T)
b. (1N, 7T)
*c. (7N, 1T)
d. (2N, 8T)

If given that (5T), (1N,6T), (2N, 7T) all represent the directed number -5, then we would say that (5T) + (1N,6T) equals 0845

*a. -10
b. +10
c. 0
d. -2

If given that (6N), (7N, 1T), (8N, 2T) all represent the directed number +6, then (6N) - (7N, 1T) equals 0846

a. -12
b. 12
c. -6
*d. 0

If given that (8N, 3T) represents +5 and (2N, 3T) represents -1, then (8N, 3T) + (2N, 3T) = (10N, 6T) or +4. Find the value of (9N, 2T) + (2N, 5T) = 0847

a. +3
*b. +4
c. +17
d. +10

If given that (8N, 5T) represents +3 and (2N, 3T) represents -1, then (8N, 5T) - (2N, 3T) = (6N, 2T) or +4. Find the value of (10N, 7T) - (4N, 5T). 0848

a. +2
b. -4
*c. +4
d. -2

THE STUDENT CAN ANALYZE SEQUENCES OF NUMBERS BY SELECTING THOSE WHICH ARE ARITHMETIC PROGRESSIONS. 0400

Which of the following is an arithmetic progression? 1567

a. 7, 9, 11, 13, 14, 15
b. 1, 4, 9, 16, 25, 36
*c. -15, -12, -9, -6, -3, 0
d. 2, 4, 8, 16, 32, 64

Which of the following is an arithmetic progression? 1568

a. 10, 20, 15, 25, 20, 30
b. 3, 7, 15, 31, 63, 127
c. $x, x^2, x^3, x^4, x^5, x^6$
*d. x + 1, x + 2, x + 3, x + 4, x + 5, x + 6

THE STUDENT WILL ANALYZE A GROUP OF NUMBERS FOR A PATTERN BY IDENTIFYING THE MISSING NUMBER. 0483

Directions: Assuming that n represents any number in the first row, determine a formula that represents the corresponding number in the second row. Then use your formula to find the missing number.

Example:

First Row	1	2	3	9
Second Row	2	4	6	

Solution: If the first row is n, then the second row is 2n; therefore if the first row is 9, the second row is 18. 1798

First Row	2	5	6	7	25
Second Row	5	11	13	15	

a. 57
b. 33
c. 49
*d. 51

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY ARITHMETIC AND GEOMETRIC THEOREMS BY FINDING SUMS OF SEQUENCES. 0534

If $|x| < 1$, consider $S - xS$ the sum of the series, $S = 1 + 3x+5x^2+7x^3+\ldots$ is 1956

a. $\frac{1 + 2x}{1-x}$
b. $\frac{1 + 2x}{(1 - x)^2}$
*c. $\frac{1 + x}{(1 - x)^2}$
d. $\frac{1 + x}{1 - x}$

A ball returns two thirds of the distance it falls on each bounce. If the ball is dropped from a height of six feet, approximately what is the total distance the ball travels before coming to rest? 1957

a. 18 feet
b. 36 feet
c. 12 feet
*d. 30 feet
e. 24 feet

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO ANALYZE A SEQUENCE BY STATING WHETHER A SEQUENCE IS A PROPORTION AND BY FINDING THE CONSTANT OF PROPORTIONALITY. 0701

Which of the following statements are false? 2664

a. $1, 5 \sim 3, 15$
b. $9, 15, 3 \sim 6, 10, 2$
c. $6, 105 \sim 2, 35$
*d. $5, 6, 13, \sim 10, 12, 39$
e. none of the above

What is the constant of proportionality in the proportion $2,3,10 \sim 8,12,40$ 2665

a. 2
b. 3
*c. 4
d. 8
e. this is not a proportion

What is the constant of proportionality in the proportion 2666
$9,33,6 \sim 6,22,4$

a. 4
b. 11
*c. 2/3
d. 1
e. this is not a proportion

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF ARITHMETIC PROGRESSIONS BY CHOOSING THE CORRECT VALUE OF A TERM OR DIFFERENCE OF TERMS. 0146

Find the 21st. term of the arithmetic progression having -2 as the first term and 4 as a common difference. 0405

a. 82
b. 86
*c. 78
d. 74

What is the common difference of an arithmetic progression if the first term is 1 and the 10th term is 28. 0406

a. 2
b. 5
c. 4
*d. 3

Find the 8th term of an arithmetic progression if the first term is 3i and the common difference is -2i. 0407

a. -13i
*b. -11i
c. -15i
d. -9i

-141 is what term of the arithmetic progression 4, -1, -6 ... 0408

a. 28th
*b. 30th
c. 29th
d. 31st.

What is the velocity/sec. of a missile 45 seconds after lift-off, if when fired vertically it rises 15,840 feet the first second, 15,808 feet the second second, and 15,776 feet the third second? 0409

*a. 14,432 feet
b. 14,400 feet
c. 14,464 feet
d. 14,368 feet

THE STUDENT CAN UNDERSTAND OBTAINING A PARTICULAR TERM OF AN ARITHMETIC PROGRESSION BY USING THE DERIVED FORMULA FOR COMPUTING THE NTH TERM. 0399

Find the 41st term of the A.P. 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, . . . 1565

a. 20
*b. 22
c. $22\frac{1}{2}$
d. 21

Which term of the A.P. 8, 5, 2, . . . is -49? 1566

a. 18
b. 21
*c. 20
d. 19

THE STUDENT WILL BE ABLE TO SHOW HIS KNOWLEDGE OF ARITHMETIC PROGRESSION AND SUMS OF ARITHMETIC PROGRESSIONS BY COMPUTING TERMS AND SUMS. 0521

Which term in the arithmetic progression 4, 1,... is -77? 1920

- a. 29
- *b. 28
- c. 27
- d. 26
- e. 25

The sum of the first n positive integers ending in 6 is best represented as 1921

- a. $n(5n+6)$
- b. $n(3n)$
- *c. $n(5n+1)$
- d. $n(5n+11)$

THE STUDENT DISPLAYS HIS ABILITY TO USE THE DEFINITION OF THE TERM GEOMETRIC PROGRESSION BY CHOOSING THE CORRECT TERM FOR A GIVEN PROGRESSION. 0148

Find the sixth term in the geometric progression 48, 96, ... 0413

- a. 1600
- b. 1580
- c. 1560
- *d. 1536

Find the first term of a geometric progression with fifth term 48 and ratio 2. 0414

- a. 1
- b. 4
- *c. 3
- d. -1

Find the general term in the geometric progression $\frac{-1}{3} a^2, a^5 \ldots$ 0415

- *a. $(-3)^{n-2} a^{3n-1}$
- b. $(-3)^{n+1} a^{2n-1}$
- c. $(-3)^{n-1} a^{2n+1}$
- d. $(-3)^{n-1} a^{n+2}$

THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE SUM OF A GEOMETRIC PROGRESSION BY CHOOSING THE CORRECT SUM FOR A GIVEN PROGRESSION. 0149

Find the sum of the geometric progression that has 4 as the first term, 3 as the common ratio and 324 as the last term. 0416

- a. 475
- b. 500
- c. 460
- *d. 484

Find the sum of $\sum_{k=1}^{6} -\frac{2}{5}\left(\frac{1}{2}\right)^{k-1}$ 0417

- a. $-\frac{56}{75}$
- *b. $-\frac{63}{80}$
- c. $-\frac{59}{80}$
- d. $\frac{52}{73}$

Find the sum of the geometric progression if the first term is 64, the last term $\frac{1}{4}$, and the common ratio is $\frac{1}{4}$. 0418

- a. $77\frac{1}{16}$
- b. $82\frac{3}{4}$
- *c. $85\frac{1}{4}$
- d. $78\frac{1}{8}$

THE STUDENT APPLIES HIS UNDERSTANDING OF THE SUM OF AN ARITHMETIC SERIES BY CHOOSING THE CORRECT SUM FOR A GIVEN SERIES. 0147

Find the sum of the arithmetic progression having 6 as the first term, 4 as the common difference, and 17 terms. 0410

*a. 646
b. 595
c. 684
d. 714

Find the sum of $\sum_{j=1}^{5} 3j$ 0411

a. 15
b. 25
c. 40
*d. 45

What are the first 3 terms of an arithmetic progression if the first term is 3, the last term is 17, and the sum of the arithmetic progression is 100. 0412

a. 3, 5, 7 ...
*b. 3, 4 5/9, 6 1/9 ...
c. 3, 4 2/7, 5 4/7
d. 3, 6, 9 ...

THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE SUM OF INFINITE GEOMETRIC SERIES BY CHOOSING THE CORRECT SUM OF A GIVEN SERIES. 0150

Find the sum of the infinite geometric series 2, -1, $\frac{1}{2}$ 0419

*a. $\frac{4}{3}$
b. $\frac{7}{5}$
c. $\frac{9}{4}$
d. $\frac{11}{6}$

Find the sum of the infinite geometric series if the first term is 6 and the common ratio is $\frac{2}{3}$ 0420

a. 12
b. 14
*c. 18
d. 20

Find the sum of the infinite geometric series 2, 1, $\frac{1}{2}$ 0421

a. 3
b. 5
c. 6
*d. 4

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE A SERIES WITH A CONTINUING PATTERN BY DETERMINING THE NEXT ELEMENT IN A SERIES. 0481

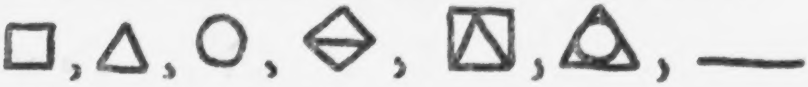
Determine the next number in the continuing pattern below: 1794
1, 1, 2, 3, 5, 8, 13, ______

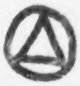
*a. 21
b. 20
c. 18
d. 22
e. 14

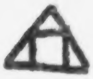
Determine the next number in the continuing pattern below: 1795
2, 3, 5, 7, 11, 13, ______

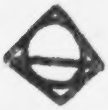
a. 15
*b. 17
c. 16
d. 14

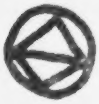
Determine the next element in the continuing pattern below: 1796



a. 

b. 

c. 

*d. 

SETS

THE STUDENT WILL BE ABLE TO DEMONSTRATE KNOWLEDGE OF THE ROSTER METHOD GIVEN A WORD DESCRIPTION OF THE SET BY CHOOSING THE NAME OF THE SET, GIVEN A CHOICE OF NAMES. 0001

The name of the set, the letters of the alphabet between g and k, using the roster method is 1388

a. $\{g, h, i, j\}$
b. $\{g, h, i, j, k\}$
*c. $\{h, i, j\}$
d. $\{h, i, j, k\}$

The name of the set, the whole numbers between 1 and 2, using the roster method is 1389

a. $\{1\}$
*b. $\{\ \}$
c. $\{1, 2\}$
d. $\{2\}$

THE STUDENT CAN TRANSLATE THE DESCRIPTION OF A SET FROM THE RULE METHOD TO THE ROSTER METHOD BY CHOOSING FROM AMONG RESPONSES, THE CORRECT REPRESENTATION. 0167

In set notation, the set of all numbers X such that X is greater than or equal to one is 0549

a. $\{x \geq 1\}$
b. $\{x: x \leq 1\}$
c. $\{x: x > 1\}$
*d. $\{x: x \geq 1\}$

Write the following sentence in set notation: The union of the set of all numbers X such that X is less than 4 and the set of all numbers X such that X is greater than -6. 0550

*a. $\{x: x < 4\} \cup \{x: x > -6\}$
b. $\{x: x > 4\} \cup \{x: x > -6\}$
c. $\{x \geq -6\} \cup \{x < 4\}$
d. $\{x: x < 4\} \cap \{x: x > -6\}$

THE STUDENT WILL BE ABLE TO SHOW HIS COMPREHENSION OF A DESCRIPTIVE SET RELATION BY LISTING THE ELEMENTS CONTAINED IN THE RELATION IN ROSTER FORM. 0560

If $A = \{4,5,6\}$ and $c = \{4,7\}$ then $\{(a,c) \mid a \in A,\ c \in C,\ a < c\}$ is represented by ______. 2025

a. $\{(4,4), (4,7), (5,4), (5,7), (6,4), (6,7)\}$
b. $\{(4,4), (4,7), (5,7), (6,7)\}$
c. $\{(3,4), (3,7), (4,7), (5,7), (6,7)\}$
d. $\{\emptyset\}$
*e. $\{(4,7), (5,7), (6,7)\}$

If $D = \{\pi, \sqrt{3}, 5\}$ and $E = \{3, 6.5\}$, then $\{(d,e) \mid d \in D,\ e \in E,\ d \geq e-2\}$ 2026

a. $\{(\pi,3), (\pi, 6.5), (\sqrt{3},3), (\sqrt{3}, 6.5), (5,3,) (5, 6.5)\}$
*b. $\{(\pi,3), (\sqrt{3}, 3), (5, 4.5)\}$
c. $\{(\pi,3), (5, 4.5)\}$
d. $\{\emptyset\}$
e. None of the above

If $A = \{0,4,8\}$ the description of $\{(x,y) \mid x,y \in A,\ y$ is a multiple of $4\}$ in roster form is ______. 2027

a. $\{0,4,8\}$
b. $\{4,8\}$
*c. $\{(0,0), (0,4), (0,8), (4,0), (4,4), (4,8), (8,0), (8,4), (8,8)\}$
d. $\{(0,4), (0,8), (4,4), (4,8), (8,4), (8,8)\}$
e. None of the above

THE STUDENT DEMONSTRATES KNOWLEDGE OF THE EMPTY SET BY SELECTING THE SYMBOL ASSOCIATED WITH THIS SET. 0032

The name of the set that has no elements is 1390

a. $\{0\}$
b. $\{\emptyset\}$
c. $\{E\}$
*d. $\{\ \}$

THE STUDENT CAN RECALL THE MEANING OF SYMBOLS THAT ARE USED IN SET NOTATION BY IDENTIFYING A CORRECT USE OF THE SYMBOL. 0632

Which of the following statements are false? 2463

a. $3 \in \{1,2,3,4\}$
b. $\{9\} \subset \{8,9,10,11\}$
c. $\{3\} \in \{1,2,3,4\}$
d. $9 \subset \{8,9,10,11\}$
*e. C and D only

THE STUDENT WILL BE ABLE TO CONVERT ENGLISH PHRASES INTO "SET BUILDER NOTATION" BY IDENTIFYING THE PROPER NOTATION GIVEN A PHRASE. 0636

The sentence "A is the set of real numbers R greater than or equal to 3 and less than 20" in set building notation is 2474

a. $\{x \mid x \in R,\ 3 \leq x \leq 20\}$
b. $\{x \mid x \subset R,\ 3 \leq x < 20\}$
c. $\{x \mid x \in R,\ 3 < x > 20\}$
*d. $\{x \mid x \in R,\ 3 \leq x < 20\}$
e. none of the above

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO RECALL THE SYMBOLS OF A LINE AND ITS SUBSET BY CHOOSING THE CORRECT MEANING FROM A LIST. 0639

The symbol $\overline{AB}$ means 2480

a. a line containing points A and B.
*b. segment whose endpoints are A and B.
c. a ray with endpoint at A and contains point B.
d. the distance from A to B.
e. none of the above.

The symbol $\overleftarrow{AB}$ means the 2481

a. line passing through points A and B.
b. segment whose endpoints are A and B.
c. ray with endpoint at A and contains point B.
d. distance from A to B.
*e. none of the above

The symbol d(A,B) means the 2482

a. line passing through point A and B.
b. segment whose endpoints are A and B.
c. ray with endpoint at A and passes through B.
*d. distance from A to B.
e. none of the above

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF THE TERMS FINITE AND INFINITE BY DESIGNATING WHETHER GIVEN SETS ARE FINITE OR INFINITE. 0003

Which of the following sets is infinite? 1393

a. $\{1, 2, 3\}$
b. $\{1, 2, 3, \ldots, 20\}$
*c. $\{2, 4, 6, 8, \ldots\}$
d. $\{1, 2, 3, 4, \ldots, 1{,}000{,}000\}$

Which of the following sets is finite? 1394

a. The set of numbers of arithmetic between 3 and 5.
b. $\{5, 10, 15, \ldots\}$
c. The set of counting numbers.
*d. $\{\ \}$

THE STUDENT CAN SHOW HIS UNDERSTANDING OF THE DEFINITION OF FINITE SET BY SELECTING FROM A LISTING OF SETS THE FINITE SET. 0366

Which one of the following is a finite set? 1478

a. integral multiples of 10
*b. integers which equal their squares
c. common fractions between 5 and 6
d. triangles each with area 15 square feet

Which one of the following is a finite set? 1479

a. whole numbers
b. natural numbers
*c. 4-digit numbers
d. squares of whole numbers
e. powers of 4-digit numbers

THE STUDENT WILL BE ABLE TO DISTINGUISH BETWEEN FINITE AND INFINITE SETS BY DETERMINING THE NUMBER OF ELEMENTS. 0631

The set $\{x \mid 3 < x \leq 10, x \text{ is an integer}\}$ contains 2460

*a. 7 elements
b. 6 elements
c. 5 elements
d. infinite
e. none of the above

The set $\{x \mid 2 < x < 3, x \text{ is an integer}\}$ contains 2461

*a. 0 elements
b. 1 element
c. 2 elements
d. infinite
e. none of the above

The set $\{x \mid 4 < x \leq 5, x \text{ is a real number}\}$ contains 2462

a. 0 elements
b. 1 element
c. 2 elements
*d. infinite
e. none of the above

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF CONVEX SETS AND HALF-PLANES BY IDENTIFYING HALF-PLANES AND CONVEX SETS FROM SET DESCRIPTIONS. 0497

Which of the following is not a convex set? 1840

a. line
b. ray
c. empty set
d. segment
*e. All points of a plane, except for one point in the plane.

The graph of $\{x \mid x \in R, 3 \leq x \leq 5\}$ is a 1841

a. half-line
b. ray
c. line
*d. segment
e. none of these

THE STUDENT WILL BE ABLE TO DISTINGUISH BETWEEN CONVEX AND NON-CONVEX SETS BY STATING WHETHER A GIVEN SET IS CONVEX OR NON-CONVEX. 0641

Which of the following does not represent a convex set? 2485

a. plane
b. half-line
*c. angle
d. interior of a circle
e. ray

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE WHETHER GIVEN SETS OF NUMBERS UNDER A GIVEN OPERATION FORM A GROUP BY IDENTIFYING WHETHER GIVEN SETS AND OPERATIONS SATISFY THE CONDITIONS OF A GROUP. 0465

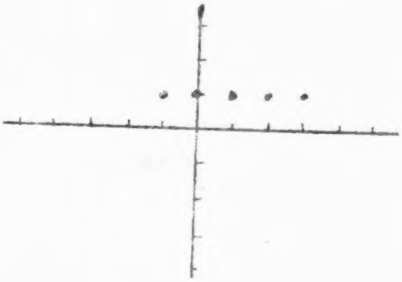
A mathematical system consists of a set of elements and an operation that combines any 2 of these elements. The mathematical system is then said to form a group if the following four properties hold.
(a) The set if closed under the given operation.
(b) The set is associative with respect to the given operation.
(c) The set contains an identity element with respect to the given operation.
(d) Each element has an inverse with respect to the given operation.

Which one of the following sets of numbers does form a group under the given operation? 1760

a. positive integers; multiplication
b. whole numbers; addition
*c. integers; addition
d. integers; multiplication

THE STUDENT DEMONSTRATES HIS ABILITY TO ANALYZE A GRAPH IN A PLANE AND DESCRIBE IT IN SET NOTATION WHEN HE CHOOSES THE SET ILLUSTRATED. 0246

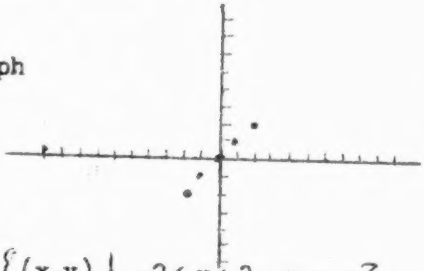
The graph



can best be described by 1229

a. $\{(x,y) \mid -1 < x \leq 3$, x and y are integers$\}$
b. $\{(x,y) \mid -2 < x < 4, y = 1\}$
c. $\{(x,y) \mid -1 \leq y \leq 3, x = 1\}$
d. $\{(x,y) \mid -2 < x < 4$, x and y are integers$\}$
*e. none of these

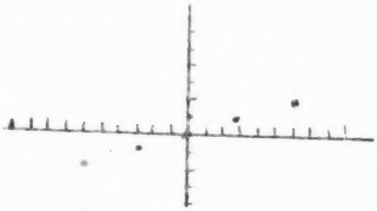
The graph



can best be described by 1230

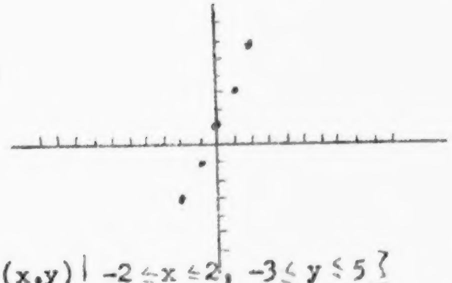
a. $\{(x,y) \mid -2 \leq x \leq 3, x = y\}$
*b. $\{(x,y) \mid -3 < x < 3, x = y$, x is an integer$\}$
c. $\{(x,y) \mid -3 < x < 4$, x and y are integers$\}$
d. all of the above
e. none of the above

The graph



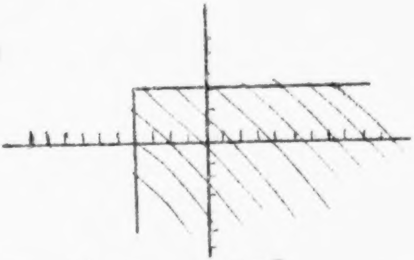
can best be described by 1231

a. $\{(x,y) \mid -6 \leq x \leq 6, y = 1/3x$, x is an integer$\}$
b. $\{(x,y) \mid -6 \leq x \leq 6, x = 1/3y$, x and y are integers$\}$
c. $\{(x,y) \mid -7 < x < 7, x = 3y$, x is an integer$\}$
*d. $\{(x,y) \mid -6 \leq x \leq 6, x = 3y$, x and y are integers$\}$
e. none of these



The graph can best be described by 1232

a. $\{ (x,y) \mid -2 \le x \le 2, -3 \le y \le 5 \}$
b. $\{ (x,y) \mid -2 \le x \le 2, -3 \le y \le 5 \}$
*c. $\{ (x,y) \mid -3 < x < 3,$ x is an integer, $y = 2x + 1\}$
d. $\{ (x,y) \mid -3 < x < 3, y = 2x + 1\}$
e. none of these



The graph can best be described by 1233

a. $\{ (x,y) \mid x > -4 \vee y < 3 \}$
b. $\{ (x,y) \mid x > -4$ and $y < 3$, x and y are integers$\}$
c. $\{ (x,y) \mid x \ge -4$ and $y \le 3$, x and y are integers$\}$
* d. $\{ (x,y) \mid x \ge -4 \cup y \le 3 \}$
a. none of the above

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF THE TERMS EQUAL AND EQUIVALENT BY DESIGNATING WHETHER TWO GIVEN SETS ARE EQUAL, EQUIVALENT, OR NEITHER. 0004

Consider the following sets:

$A = \{2, 4, 6\}$ $B = \{0, 2, 4, 6\}$

$C = \{1, 3, 5\}$ $D = \{6, 2, 4\}$

$E = \{1, 5, 7, 9\}$

Which of the following is true? 1395

a. A is equivalent to B
b. C is equal to A
*c. A is equal to D
d. E is equivalent to C

THE STUDENT CAN SHOW HIS UNDERSTANDING OF THE DEFINITION OF EQUAL SETS BY IDENTIFYING THE PAIR OF EQUAL SETS FROM A LIST OF SET PAIRS. 0364

Which two sets below are equal? 1475

a. {even natural numbers between 2 and 4} and {odd natural numbers between 2 and 4}
*b. {natural numbers between 2 and 4} and {odd natural numbers between 7 and 17}
c. {even natural numbers between 2 and 4} and {natural numbers between $\sqrt{7}$ and $\sqrt{17}$}
d. {odd natural numbers between $\sqrt{7}$ and $\sqrt{17}$} and {odd natural numbers between 2 and 6}

Which of the following are equal sets? 1476

a. {2,4,6} and {a,b,c}
b. {a,b,c} and {d,e,f}
*c. {2,4,6} and {6,4,2}
d. {2,4,6} and {d,e,f}

THE STUDENT CAN SHOW HIS UNDERSTANDING OF THE DEFINITION OF ONE-TO-ONE CORRESPONDENCE BY IDENTIFYING SETS THAT HAVE THIS PROPERTY. 0365

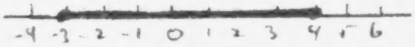
Which of the following sets can be put in a one-to-one correspondence? 1477

*a. {f,e,g} and {4,5,6}
b. {f,e,g} and {f,e}
c. {f,e,g} and {f,e,g,h}
d. {f,e,g} and {4,5}

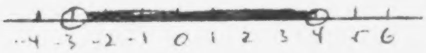
THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF A SET INVOLVING BOTH EQUALITY AND INEQUALITY BY DRAWING THE GRAPH OR IDENTIFYING THE GRAPH WHICH REPRESENTS A GIVEN SET. 0370

Which of the following is the graph of the set $\{x: -3 < x \leq 4\}$? 1488

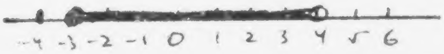
a.



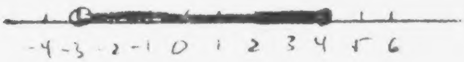
b.



c.



*d.



THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE PROPERTIES OF AN EQUIVALENCE RELATION WHICH A GIVEN RELATION SATISFIES, BY SELECTING THOSE PROPERTIES WHICH HOLD FOR THE GIVEN RELATION. 0499

Consider the set S of all points in a plane. The plane is separated into half-planes by a line. The relation, on S, "Is in the same half-plane"has which of the following properties? 1845
I. Reflexive II. Symmetric III. Transitive

a. I only
b. II only
c. III only
d. none of these
*e. I, II, and III

Let the relation "intersects" be defined on the set of all lines in a plane. Which of the properties I) reflexive, II) symmetric, and III) transitive, does this relation satisfy? 1846

a. I only
b. II only
c. III only
*d. I and II only
e. II and III only

THE STUDENT WILL TRANSLATE RELATIONSHIPS BETWEEN DIFFERENT TYPES OF QUADRILATERALS BY CHOOSING CORRECT SUBSET NOTATION AND VENN DIAGRAMS. 0172

Given:

Name	Defined Properties	Proved Properties
Quadrilateral	4-side polygon	
Trapezoid	1 pair of sides parallel	
Parallelogram	Both pairs of opposite side parallel	Diagonals form 2 = s Opposite sides = Opposite angles = Diagonals bisect each other Consecutive angles supp
Rectangle	▱ with rt. angle	All those of ▱ plus: Each∠is a rt.∠ Diagonals =
Rhombus	▱ with 2 consecutive sides =	All those of a▱plus: Diagonals ⊥ Diagonals bisect∠s.
Square	Rectangle with 2 consecutive sides =	All those of a rectangle and all those of a rhombus

$\{\text{Quadrilaterals}\} \subset \{\text{Parallelograms}\}$ 0566

a. true
*b. false

$\{\text{Squares}\} \subset \{\text{Rhombus}\}$ 0567

*a. true
b. false

$\{\text{Rectangles}\} \subset \{\text{Rhombus}\}$ 0568

a. true
*b. false

$\{\text{Rhombus}\} \subset \{\text{Rectangles}\}$ 0569

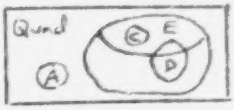
a. true
*b. false

{Rectangles}⊂{Parallelograms} 057

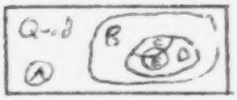
*a. true
b. false

Which Venn Diagram best describes the relationship between the named quadrilaterals. (A = {Trapezoid}, B = {Parallelograms}, C = {Rectangles}, D = {Rhombus}, E = {Squares}. 0571

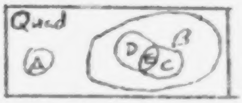
a.



b.



*c.

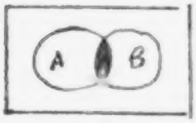


d. None of the above.

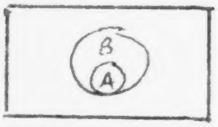
THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF THE "RELATIONS" OF TWO SETS BY MATCHING THE CORRECT VENN DIAGRAM FOR EACH RELATION. 0594

The Venn diagran which illustrates the union of two sets A and B is: 2133

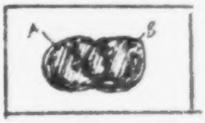
a.



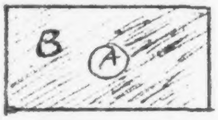
b.

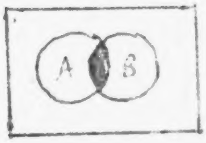


*c.



d.





is a Venn diagram representing: 2134

the following relation between the two sets A and B.

a. $A \cup B$
b. $A \subseteq B$
c. $A \cong B$
*d. $A \cap B$
e. $A \subset B$

GIVEN SEVERAL SETS, THE STUDENT WILL BE ABLE TO DETERMINE WHICH SETS ARE SUBSETS OF OTHERS. 0002

Consider the following sets:

$A = \{1, 3, 5\}$ $B = \{0, 1, 3, 5\}$

$C = \{\emptyset\}$ $D = \{1, 3, 6, 7\}$

$E = \{(2-1), 6/2, (8-3)\}$ $F = \{3, 5, 7, 9\}$

Which of the following is true? 1391

*a. A is a subset of B
b. B is a subset of A
c. A is a subset of D
d. B is a subset of E

Which of the following is true? 1392

a. A is a subset of E
b. C is a subset of A
c. E is a subset of B
*d. All of the above
e. None of the above

THE STUDENT CAN WRITE THE SUBSETS OF A GIVEN SET AND RECOGNIZE THE SYMBOL FOR SUBSET, THUS DEMONSTRATING HIS KNOWLEDGE OF SET TERMINOLOGY. 0216

The symbol for subset is 1122

a. $\cup$
b. $\cap$
*c. $\subset$
d. $\supset$
e. None of the above

How many subsets of set A can be written if $A = \{2,3,4\}$? 1123

a. 6
b. 7
*c. 8
d. 9
e. None of the above

Which of the following are NOT subsets of $X = \{a,b,c,d\}$? 1124

a. $\{a,b,c\}$
b. $\{d,c,b,a\}$
c. $\{\ \}$
*d. None of the above

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF THE DEFINITION OF PROPER SUBSET BY SELECTING FROM A LISTING A PROPER SUBSET OF A GIVEN SET. 0367

Which of the following is a proper subset of the set $\{a,b,c\}$? 1480

a. $\{a,b,c\}$
b. $\{a,b,d\}$
c. $\{a,b,c,d\}$
*d. $\{a, b\}$

Which of the following is a proper subset of the set $\{11,12,13.14\}$? 1481

a. $\{11,12,13,14\}$
b. $\{10,12,13,14\}$
c. $\{14,13,12,11\}$
*d. $\{12,13,14\}$

THE STUDENT CAN DEMONSTRATE HIS UNDERSTANDING OF THE MEANING OF A SUBSET BY IDENTIFYING THE NUMBER OF SUBSETS A GIVEN SET CONTAINS. 0463

Given: $A = \{1,2,3,4\}$

How many subsets are contained in set A? 1756

a. 12
b. 14
*c. 16
d. 10
e. 8

How many different subsets can be formed from a set consisting of n elements? 1757

a. $2n$
b. n^2
c. $n + n$
*d. 2^n
e. $\frac{n}{2}$

THE STUDENT WILL SHOW HIS COMPREHENSION OF SETS BY COUNTING THE TOTAL NUMBER OF SUBSETS FOR A GIVEN SET. 0554

How many different subsets are there for set A. Given A = $\{1,2,3\}$ 2014

a. 1
*b. 8
c. 7
d. 6
e. 3

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF SETS OF NATURAL NUMBERS, INTEGERS, RATIONAL NUMBERS, AND IRRATIONAL NUMBERS BY IDENTIFYING SETS THAT ARE SUBSETS OF THESE SETS. 0595

Find the subset of A = $\{-3,5,\sqrt{2}, 0, -1/2, 2.13\}$ having the least number of elements that contains all irrational numbers in A. 2135

a. $\{5\}$
b. $\{-3,0,5\}$
c. $\{-3,5,0,-1/2,2.13\}$
*d. $\{\sqrt{2}\}$

THE STUDENT WILL DEMONSTRATE UNDERSTANDING OF THE CONCEPT OF SUBSETS BY COMPUTING THE NUMBER OF SUBSETS A SET HAS. 0633

The set $\{a,b,c\}$ has exactly 2464

a. 3 subsets
b. 6 subsets
c. 7 subsets
*d. 8 subsets
e. none of the above

The two sets $\{-1,0,1\}$ and $\{1,2,3\}$ have 2465

a. 0 subsets in common
b. 1 subset in common
*c. 2 subsets in common
d. 3 subsets in common
e. none of the above

Which of the following is not a subset of $\{0,1,35\}$ 2466

a. $\{\ \}$
b. $\{0,1,35\}$
c. $\{1\}$
d. $\{0,35\}$
*e. none of the above

THE STUDENT CAN RECALL THE DEFINITIONS OF THE SYMBOLS OF SUBSETS OF A LINE BY CHOOSING THE CORRECT SYMBOL FOR THE RELATION OF TWO SUBSETS. 0647

If B is the midpoint of $\overline{AC}$ then which of the following statements are not true? 2498

a. $d(A,B) + d(B,C) = d(A,C)$
*b. $\overline{AB} = \overline{BC}$
c. $\overline{AB} \cong \overline{BC}$
d. $\overline{AC} = \overline{AC}$
e. $\overline{AC} \cong \overline{AC}$

If $\overline{AB} = \overline{BC}$, this means 2499

*a. the two segments contain the same elements
b. the two segments have the same measure
c. that B is the midpoint of $\overline{AC}$
d. the two segments are subsets of opposite rays

GIVEN TWO SETS, THE STUDENT WILL DEMONSTRATE UNDERSTANDING OF THE OPERATIONS OF UNION AND INTERSECTION BY SELECTING THE RESULTS OF THE OPERATION. 0015

If set $A = \{0, 2, 4, 6\}$ and set $B = \{1, 2, 3, 4, 5\}$ then $A \cup B =$ __________ 1433

a. $\{0, 2, 4\}$
b. $\{2, 4\}$
*c. $\{0, 1, 2, \ldots 6\}$
d. $\{1, 3, 5\}$

If set $C = \{1, 3, 5, 7\}$ and $D = \{1, 2, 3, 4, 5, 6\}$ then $C \cap D =$ __________. 1434

*a. $\{1, 3, 5\}$
b. $\{1, 2, 3, 4, 5, 6, 7\}$
c. $\{1, 3\}$
d. $\{2, 4, 6\}$

THE STUDENTS WILL BE ABLE TO APPLY THE OPERATIONS OF SETS BY CHOOSING THE CORRECT OPERATION TO PRODUCE A GIVEN SET. 0187

Set $A = \{1,2,3,4,5\}$
Set $B = \{6,7,8,9,10\}$
Set $C = \{2,4,6,8,10\}$
Set $D = \{1, 3, 5, 7, 9\}$
Set $E = \{1,3,5\}$

The operation that produces the solution set $\{2,4\}$ is 0637

a. $A \cup B$
b. $C \cup D$
*c. $A \cap C$
d. $B \cap D$
e. None of the above

The operation that produces the solution set $\{1,2,3,4,5,6,7,8,9,10\}$ is 0638

a. $A \cap B$
*b. $C \cup D$
c. $A \cap C$
d. $B \cup D$
e. None of the above

The operation that produces the solution $\{1,3,5\}$ is 0639

a. $A \cup E$
b. $B \cup D$
c. $B \cap E$
*d. $A \cap D$
e. None of the above

The operation that produces the solution $\{\emptyset\}$ is 0640

a. $A \cup E$
b. $B \cap C$
c. $B \cup E$
d. $A \cap D$
*e. None of the above

The operation that produces the solution $\{1,3,5,6,8,10\}$ is 0641

a. $(E \cup B) \cap C$
*b. $E \cup (B \cap C)$
c. $(C \cup D) \cap E$
d. $C \cup (D \cap E)$
e. None of the above

THE STUDENT WILL BE ABLE TO APPLY THE SET OPERATIONS INTERSECTION, AND UNION BY SELECTING THE CORRECT RESULT FOR A GIVEN OPERATION. 0215

If $A = \{2,5,10,11\}$ and $B = \{2, 3, 5\}$, the elements in $A \cup B$ are 1117

a. $\{2,5\}$
b. $\{2, 2,3,5,5,10,11\}$
*c. $\{2,3,5,10,11\}$
d. $\{\emptyset\}$
e. None of the above

If $C = \{a,b,c\}$ and $D = \{b,d,f\}$ the elements in $C \cap D$ are 1118

*a. $\{b\}$
b. $\{b,b\}$
c. $\{a,b,c,d,f\}$
d. $\{\ \}$
e. None of the above

If $E = \{5,10,15\}$ and $F = \{20,25,30\}$, the elements in $E \cap F$ are 1119

a. $\{5\}$
b. $\{10,20,30\}$
c. $\{5,10,15,20,25,30\}$
*d. $\{\ \}$
e. None of the above

If $P = \{1,2,3,4\}$, $Q = \{2,4,8,10\}$ and $R = \{4,8,12,16\}$, the elements in $P \cap Q \cap R$ are 1120

a. $\{2,4\}$
b. $\{1,2,3,4,8,10,12,16\}$
*c. $\{4\}$
d. $\{\ \}$
e. None of the above

If $A = \{1,2,3,4,5\}$ it is the union of 1121

a. $B = \{1,2\}$ and $C = \{3,4,5,6\}$
*b. $B = \{1,2,3\}$ and $C = \{2,3,4,5\}$
c. $B = \{0,1,2,3,4,5\}$ and $C = \{1,2,3,4,5,6\}$
d. $B = \{1,2,3\}$ and $C = \{5\}$
e. None of the above

THE STUDENT WILL SHOW HIS COMPREHENSION OF SETS BY DETERMINING THE INTERSECTION AND UNION OF GIVEN SETS. 0555

If $A = \{a,b\}$ and $B = \{b,c\}$ then which of the following represents $A \cup B$? 2015

a. $\{\ \}$
b. $\{a,b\}$
c. $\{b,c\}$
*d. $\{a,b,c\}$
e. $\{a,c\}$

If $M = \{m,n,p\}$ and $N = \{n,p,q\}$ then which of the following represent $M \cap N$? 2016

a. $\{m,n,p,q\}$
b. $\{m,n,p\}$
c. $\{n,p,q\}$
d. $\{\emptyset\}$
*e. $\{n,p\}$

If $A = \{a,b,c,d\}$ and $B = \{c,d,e,f\}$ then which of the following represent $(A \cap B) \cup (A \cup B)$? 2017

*a. $\{a,b,c,d,e,f\}$
b. $\{a,b,c,d\}$
c. $\{c,d,e,f\}$
d. $\{d,d\}$
e. $\{\emptyset\}$

THE STUDENT CAN DEMONSTRATE KNOWLEDGE OF SET OPERATIONS BY COMPUTING THE UNION AND INTERSECTION. 0634

If set A is $\{1,3,5,6\}$ and set B is $\{2,4,5,6\}$ then $A \cap B$ is 246

a. $\{1,2,3,4\}$
b. $\{1,2,3,4,5,6\}$
c. $\{1,3\}$
*d. $\{5,6\}$
e. none of the above

If set A is $\{2,4,6,7\}$ and set B is $\{1,3,5,7\}$ then $A \cup B$ is 2468

a. $\{1,2,3,4,5,6\}$
b. $\{1,3,5,7\}$
c. $\{2,4,6,7\}$
d. $\{7\}$
*e. none of the above

If set A is $\{2,4,6,8\}$ and set B is $\{1,3,5,7\}$ then $A \cap B$ is 2469

a. $\{1,2,3,4,5,6,7,8\}$
b. $\{2,4,6,8\}$
c. $\{1,3,5,7\}$
d. $\{8\}$
*e. none of the above

If set A is $\{1,2,3,4\}$, set B is $\{5,6,7,8\}$ and set C is $\{1,3,5,7\}$ then $(A \cup B) \cap C$ is 2470

a. $\{1,2,3,4,5,6,7,8\}$
b. $\{1,2,3,4,5,7\}$
c. $\{1,3,5,6,7,8\}$
*d. $\{1,3,5,7\}$
e. none of the above

If set A is $\{1,2,3,4\}$, set B is $\{5,6,7,8\}$ and set C is $\{1,3,5,7\}$ then $A \cup (B \cap C)$ is 2471

a. $\{1,2,3,4,5,6,7,8\}$
*b. $\{1,2,3,4,5,7\}$
c. $\{1,3,5,6,7,8\}$
d. $\{1,2,3,4\}$
e. none of the above

THE STUDENT WILL APPLY THE CONCEPT OF CARTESIAN PRODUCT, BY DETERMINING THE NUMBER OF ELEMENTS IN SPECIFIED CARTESIAN PRODUCTS, OR DETERMINING EQUALITY OF CARTESIAN PRODUCTS. 0498

If set A has 5 elements and set B has 8 elements, how many ordered pairs are in the cartesian product A X B? 1842

a. 5
*b. 40
c. 13
d. 8
e. none of these

If A and B are sets and A X B = B X A, then it is necessary that 1843

*a. A=B
b. $A \times B = \emptyset$
c. $A \subset B$ or $B \subset A$
d. $A = \emptyset$ or $B = \emptyset$
e. none of these

If $A = \{1,3,5\}$, $B = \{2,4,6\}$, determine the relation $\{(a,b) \mid a \in A, b \in B, b=2a\}$. 1844

a. $\{(1,2), (3,4), (5,6)\}$
b. $\{(1,2)\}$
*c. $\{(1,2), (3,6)\}$
d. $\{(3,6)\}$
e. $\{(1,2), (2,4), (3,6)\}$

SIMPLIFICATION

GIVEN AN ALGEBRAIC EXPRESSION CONTAINING THE OPERATIONS OF MULTIPLICATION AND DIVISION, THE STUDENT DEMONSTRATES HIS ABILITY TO SIMPLIFY THE EXPRESSION BY CHOOSING THE CORRECT SIMPLIFICATION. 0057

The simplified form of $\frac{a^2b}{c} \cdot \frac{c^3d}{a^3} \div b^2d$ is 0093

a. $\frac{d}{a^2b}$
b. $\frac{c^2}{d^2}$
*c. $\frac{c^2}{ab}$
d. $\frac{d}{ab}$

$\frac{9m + n}{9mn} \div \frac{3m - n}{3m} \cdot \frac{12}{3m + n} =$ 0094

*a. $\frac{36m + 4n}{n(9m^2 - n^2)}$
b. $\frac{36m}{3n(3m - n)}$
c. $\frac{36m}{3m - n}$
d. $\frac{12m}{3(m + n)}$

THE STUDENT DEMONSTRATES HIS ABILITY TO EXPRESS AN ALGEBRAIC EXPRESSION IN LOWEST TERMS BY CHOOSING THE CORRECT REDUCTION. 0092

Reduce to lowest terms: $(T^2 + T - 6)(T^2 + 2T - 3)^{-1}$ 0219

a. $\frac{T - 1}{T + 3}$
b. $T - 2$
*c. $\frac{T - 2}{T - 1}$
d. $\frac{T + 2}{T + 3}$

Reduce to lowest terms $\frac{3x - 6 + ax - 2a}{x - 2}$ 0220

a. $\frac{ax - 6}{x - 2}$
b. $x - 2$
c. $\frac{3 + a}{x - 2}$
*d. $3 + a$

Reduce $\frac{2x^2y^2 + 5xy - 3}{x^2y^2 - 9}$ to lowest terms. 0221

a. $\frac{xy + 3}{xy - 3}$
*b. $\frac{2xy - 1}{xy - 3}$
c. $x u + 3$
d. $\frac{xy + 3}{2xy - 1}$

Reduce to lowest terms $\frac{(x - y)^{-3}}{(x - y)^{-5}}$ 022

a. $x^2 - y^2$
b. $y^2 + x^2$
*c. $(x - y)^2$
d. $(x + y)$

THE STUDENT WILL BE ABLE TO APPLY THE PROPERTIES OF DIVISION, MULTIPLICATION, AND ADDITION OF ALGEBRAIC EXPRESSIONS BY CHOOSING THE CORRECT SIMPLIFIED FORM FOR A GIVEN EXPRESSION. 018

The expression $(5\ xy)(-3\ xy)\ (\frac{1}{15}xy)$ written in simplified form is 06

a. $+ x^2y^2$
b. $- x^2y^2$
c. x^3y^3
d. $5\ x^3y^3$
*e. none of the above

The expression $7x + 2x + 10 - 4$ written in the simplified form is 0643

a. $9x + 14$
b. $9x - 6$
c. $15x$
d. $5x + 6$
*e. none of the above

The expression $8x - 5y - 26x - y$ written in simplified form is 0644

a. $18x - 6x$
*b. $-18x - 6y$
c. $34x - 6y$
d. $-34x - 6y$
e. none of above

The expression $7x - 4(5x - 3)$ written in simplified form is 0645

a. $-13x - 12$
b. $-13x - 3$
c. $27x + 12$
d. $27x - 12$
*e. none of the above

The expression $\frac{6}{a} - \frac{7}{b} - \frac{10}{a} + \frac{5}{b}$ written in simplified form is 0650

a. $\frac{-2}{ab}$
b. $\frac{-6}{ab}$
*c. $-\frac{4}{a} - \frac{2}{b}$
d. $\frac{4}{a} + \frac{2}{b}$
e. none of the above

The expression $(6x - 3y) - (4x - 2y)$ written in simplified form is 0651

a. $2x - 5y$
*b. $2x - y$
c. $10x - 5y$
d. $10x + y$
e. none of the above

The expression $6x^4y^5 \div 12x^6y^2$ written in simplified form is 0652

a. $72\,x^{10}y^7$
b. $2x^{10}y^7$
*c. $\frac{y^3}{2x^2}$
d. $\frac{2x^2}{y^3}$
e. none of the above

The expression $(3x)(5x)$ written in simplified form is 0653

a. $8x$
b. $8x^2$
c. $15x$
*d. $15x^2$
e. none of the above

The expression $\frac{15}{x^2} \div \frac{25}{x}$ written in simplified form is 065

a. $\frac{375}{x^3}$
b. $\frac{15x}{25x^2}$
*c. $\frac{3}{5x}$
d. $\frac{5x}{3}$

e. none of the above

The expression $(\frac{1}{4}\,x^2y) \div (\frac{3}{2}\,xy)$ written in simplified form is 065

a. $\frac{3x^3y^2}{8}$
*b. $\frac{1}{6}\,x$
c. $\frac{3xy}{6}$
d. $6y$
e. none of the above

THE STUDENT SHOULD DEMONSTRATE HIS ABILITY TO TRANSLATE LINEAR EQUATIONS BY SELECTING THE CORRECT SIMPLIFIED FORM. 0272

Which of the following equations is equivalent to $3\ (4x + 3) - 12 = 4x - 9$? 1340

a. $16x = -12$
b. $16x = -6$
c. $8x = 0$
*d. $8x = -6$

Which of the following equations is equivalent to $y = 20 - 3\ (y + 4)$? 1341

*a. $4y = 8$
b. $4y = 32$
c. $4y = 24$
d. $4y = 16$

SLOPE - INTERCEPT

THE STUDENT APPLIES HIS KNOWLEDGE OF THE SLOPE OF A LINE BY SELECTING THE CORRECT SLOPE FOR EACH PAIR OF POINTS. 0064

The slope of the line thru the points (6,2) and (1,3) is: 0118

a. 1/5
*b. -1/5
c. $\frac{5}{-1}$
d. $\frac{5}{1}$

The slope of the line thru the two points (8,0) and (6,3) is: 0119

a. $\frac{3}{2}$
b. $\frac{2}{3}$
*c. $\frac{3}{-2}$
d. $\frac{-2}{3}$

Given (-3,2a); (-1,3a); $m = -\frac{1}{2}$. Determine a so that the slope m of the line through the given points has the given value. 0120

a. a = 0
*b. a = -1
c. a = -2
d. a = -3

The slope of any vertical line is always 0121

a. 0
b. 1
*c. Undefined

THE STUDENT APPLIES HIS KNOWLEDGE OF THE SLOPE INTERCEPT FORM OF A LINE BY CHOOSING THE CORRECT EQUATION FOR A GIVEN SLOPE AND INTERCEPT. 0065

Knowing that the general form of a line is $y = mx + b$ what is the linear equation, with integral coefficients, with the slope 3 and y intercept is 1? 0122

a. $y = x + 3$
b. $y = -x + 3$
*c. $y = 3x + 1$
d. $y = 3x - 1$

If the slope m of a line is $-4/7$ and the y- intercept b is 5, what is the equation of the line, with integral coefficients, that has these two characteristics? 0123

a. $y = -4/7x$
b. $y = -4x + 35$
c. $4y = -7x + 35$
*d. $7y = -4x + 35$

The equation of the line through the points (6,4) and (1,3) is 0124

a. $5y = x - 14$
b. $y = 5x - 26$
c. $y = 5x + 26$
*d. $5y = x + 14$

The equation of the line through the point (5,2) having slope 3/2 is 0125

a. $3y = 2x - 11$
b. $2y = 3x + 17$
*c. $2y = 3x - 11$
d. $3y = 2x + 17$

The equation of the line parallel to $x + 2y = 3$ and passing thru the point (3,4) is 0126

a. $2y = -x + 3$
b. $2y = -x + 1$
c. $2y = 2x + 4$
*d. $2y = -x + 11$

GIVEN AN EXPLANATION OF PERPENDICULAR LINES IN A PLANE, THE STUDENT DEMONSTRATES HIS ABILITY TO APPLY THE NEW INFORMATION TO THE CONCEPTS OF THE Y INTERCEPT FORM OF A LINE BY CHOOSING THE CORRECT EQUATION FOR THE GIVEN CONSTRAINTS. 0066

If two lines are perpendicular they intersect at an angle of 90 degrees. Also if two lines are perpendicular their slopes are negative reciprocals. That is if one line has slope -2/1 then a line perpendicular to it would have slope ½. With this information try to answer the following question.

Given the line $x + 2y = 6$, what is the equation of the line perpendicular to the given line and passing thru the point (-6,-2) 0127

a. $y = x + 1$
b. $y = 2x + 3$
*c. $y = 2x + 10$
d. $y = -x-8$

Using the information in the problem above, what is the equation of the line perpendicular to $3x + 2y = 4$ and passing thru the point (3,1) 0128

a. $2y - 3x = 10$
b. $3y + 2x = 9$
*c. $3y - 2x = -3$
d. $3y + 2x = 7$

GIVEN THE X-INTERCEPT AND/OR Y-INTERCEPT, THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE EQUATION SATISFYING THE GIVEN CONDITIONS BY CHOOSING THE CORRECT EQUATION FOR EACH SET OF CONDITIONS. 0067

What is the equation of the line given the x-intercept is 3, and the slope is $\frac{3}{2}$? 0129

a. $2y = 3x + 6$
*b. $2y - 3x + 9 = 0$
c. $3y - 2x = 6$
d. $3y + 2x = 0$

What is the equation of the line that has the x-intercept -6, and the y-intercept 12? 0130

a. $2y = x + 6$
b. $2y - x + 6 = 0$
*c. $y = 2x + 12$
d. $2y = x + 12$

GIVEN AN EXPLANATION OF PARALLEL LINES IN A PLANE THE STUDENT WILL DEMONSTRATE HIS ABILITY TO INTEGRATE THE NEW INFORMATION WITH THE PREVIOUS INFORMATION ON SLOPE, Y-INTERCEPT FORM OF A LINE, AND X AND Y INTERCEPTS BY CHOOSING THE CORRECT EQUATION FOR EACH SET OF CONDITIONS. 0068

Two lines in the same plane that do not intersect are said to be parallel. Algebraically two parallel lines have the same slope. With this information answer the following questions.

What is the equation of the line parallel to $2x + y = 6$ and passing through the point (4,0)? 0131

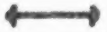
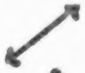
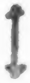
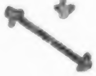
a. $y = -\frac{1}{2}x + 2$
b. $y = \frac{1}{2}x + 2$
c. $y = 2x + 14$
*d. $y = -2x + 8$

What is the equation of the line parallel to $2y + 3x = 0$ and passing through the point (2,3)? 0132

*a. $3x + 2y - 12 = 0$
b. $2y - 3x + 1 = 0$
c. $2y + 3x = 0$
d. $3y - 2x = 5$

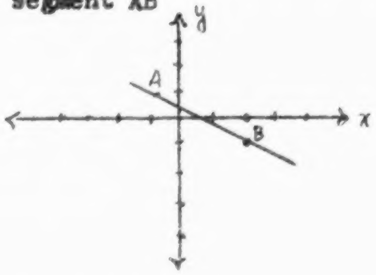
THE STUDENT CAN RECALL BASIC KNOWLEDGE ABOUT THE SLOPE OF A LINE BY CHOOSING THE CORRECT SLOPE FOR A GIVEN GRAPH. 0169

Directions: Match column I with column II.

	Column I	Column II	
*a	slope is zero	a. 	0555
*b	slope is positive	b. 	0556
*d	slope is negative	c. 	0557
*c	slope is undefined	d. 	0558

THE STUDENT CAN CALCULATE THE SLOPE OF A LINE WHEN GIVEN A GRAPHIC REPRESENTATION OF THE LINE BY CHOOSING THE CORRECT SLOPE. 0170

Directions: Find the slope of segment $\overline{AB}$



a. $\frac{-2}{-3}$

*b. $-\frac{2}{3}$

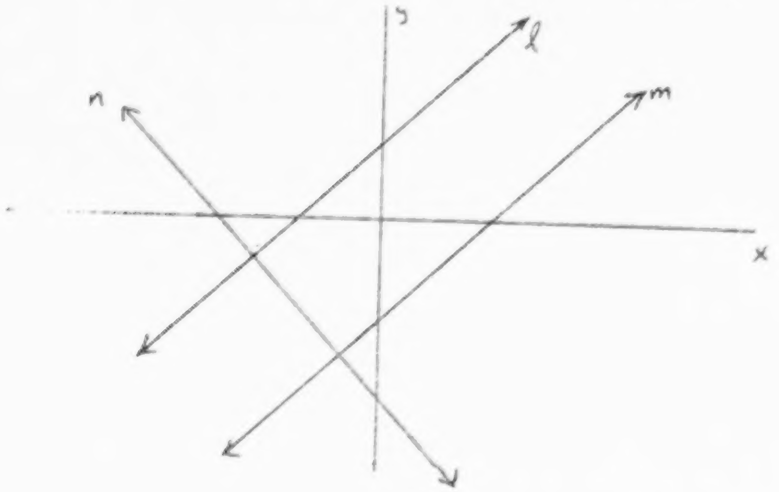
c. $-\frac{3}{2}$

d. a and b

e. cannot be determined from given information

THE STUDENT WILL ANALYZE A GRAPH BY SELECTING THE CORRECT CONCLUSION FOR GIVEN INFORMATION ABOUT SLOPES. 0179

Directions: Use this drawing for the following items.



Knowing the slopes of line l and line m, one should conclude that 058

- a. the slope of line l is equal to the slope of line n
- *b. the slope of line m is equal to the slope of line l
- c. the slope of line n is equal to the slope of line m
- d. all the lines have equal slopes
- e. none of the above

Using the information formulated in the above item and the given information that l||m, one should conclude that 059C

- *a. two nonvertical lines are parallel if and only if they have equal slopes.
- b. two nonvertical lines are parallel, if and only if they have nonequal slopes.
- c. the slopes have no connection with the relationship of parallelism between lines.

Knowing the slopes of line l, m, and n, one should conclude that 0591

a. the slope of line l is equal to the slope of line n
b. the slope of line m and slope of line n are equal
*c. the slope of line n is the negative reciprocal of the slope of line m and line l

Using the information formulated in the above item and the given information that $l \perp n$ and $m \perp n$, one should conclude that 0592

*a. two lines are $\perp$ if the slope of one line is the negative reciprocal of the slope of the other line
b. two lines are $\perp$ if the slope of one line is the reciprocal of the slope of the other line
c. two lines are $\perp$ if the slopes are equal

THE STUDENT DETERMINES HOW TO COMPUTE THE SLOPE OF A LINE FROM EXAMPLES BY CHOOSING THE CORRECT SLOPE FOR A NEW PROBLEM. 0247

The slope of the line passing through the points (5,3) and (2,1) is $\frac{2}{3}$; the slope of the line passing through the points (-3, 5) and (5, -2) is $\frac{-7}{8}$. On the basis of these two examples, decide how slope is computed. The slope of the line passing through the points (11, 2) and (-3, 0) is . . . 1234

a. 7
*b. $\frac{2}{14}$ or $\frac{1}{7}$
c. $\frac{2}{8}$ or $\frac{1}{4}$
d. $-\frac{1}{7}$
e. None of the above

On the basis of the above problem's information, the slope of the line passing through the points (5, 7) and (11, 2) is . . . 1235

*a. $\frac{-5}{6}$
b. $\frac{-6}{5}$
c. $\frac{5}{6}$
d. $\frac{6}{5}$
e. None of these

On the basis of the information in the first item, the slope of the line passing through the points (5, 3) and (2, 3) is . . . 1236

a. $\frac{1}{2}$

b. $-\frac{1}{2}$

*c. 0

d. indeterminable

e. None of these

On the basis of the information in the first item, the slope of the line passing through the points (6, 2) and (6, -3) is . . . 1237

a. 0
b. 5
c. -5
d. $\frac{4}{3}$
*e. None of these

On the basis of the information in the first item, the slope of the line passing through the points (x_1, y_1) and (x_2, y_2) is . . . 1238

a. $\frac{x_1 - x_2}{y_1 - y_2}$

b. $\frac{x_2 - x_1}{y_2 - y_1}$

*c. $\frac{y_1 - y_2}{x_1 - x_2}$

d. $\frac{y_1 - y_2}{x_2 - x_1}$

e. None of these

GIVEN ADEQUATE INFORMATION, THE STUDENT DEMONSTRATES HIS ABILITY TO WRITE THE EQUATION FOR A PARTICULAR LINE IN SLOPE-INTERCEPT, POINT-SLOPE OR INTERCEPT FORM BY HIS CHOICE OF EQUATIONS FOR A GIVEN PAIR OF POINTS. 0252

A line passes through the points (5,-2) and (3,5). The equation for this line in point-slope form is 1250

a. $y = -\frac{7}{2}x + b$ b. $y = -\frac{7x}{2} + \frac{31}{2}$

c. $y - 5 = \frac{-2}{7}(x - 3)$ *d. $y + 2 = -\frac{7}{2}(x - 5)$

e. none of the above

The equation for the line passing through the points (2,0) and (5,-2) written in slope-intercept form is 1251

*a. $y = -\frac{2}{3}x + \frac{4}{3}$

b. $y = -\frac{2}{3}(x - 2)$

c. $y + 2 = -\frac{2}{3}(x - 5)$

d. $y = -\frac{2}{3}x + 4$

e. none of the above

The equation for the line passing through the points (3,-1) and (11,2) is 1252

a. $y = \frac{3}{8}x - \frac{17}{8}$

b. $y - 2 = \frac{3}{8}(x - 11)$

c. $y + 1 = \frac{3}{8}(x - 3)$

*d. all of the above

e. none of the above

The equation for the line passing through the points (-2,-1) and 9 (6,-3) is 1253

a. $y = \frac{1}{2}x + 0$

b. $y + 1 = \frac{1}{2}(x + 2)$

c. $y + 3 = \frac{1}{2}(x - 6)$

d. all of the above

*e. none of the above

The equation for the line passing through the points (-3,5) and (4,6) written in intercept form is 1254

a. $\frac{x}{-3} + \frac{y}{5} = 1$

b. $\frac{x}{-7} + \frac{y}{-1} = 1$

*c. $\frac{x}{-38} + \frac{7y}{38} = 1$

d. indeterminable

e. none of the above

The equation for the line passing through the point (-2,5) and having a slope of ½ written in point-slope form is 1255

a. $y-5 = \frac{1}{2}(x + 2)$

b. $y - 7 = \frac{1}{2}(x - 2)$

c. $y - 8 = \frac{1}{2}(x - 4)$

*d. all of the above

e. none of the above

The equation of the line passing through the point (5,3) is 1256

a. $y - 3 = \frac{3}{5}(x - 5)$

b. $y - 5 = \frac{3}{5}(x - 3)$

c. $y - 3 = \frac{5}{3}(x - 5)$

*d. indeterminable

e. none of the above

Given the slope of a line is ½, in order to write the equation of the line we also need to know 1257

a. the y-intercept
b. the x-intercept
c. a point on the line
*d. any of the above
e. none of the above

THE STUDENT WILL BE ABLE TO TRANSLATE THE EQUATIONS OF LINES IN THESE FORMS BY SELECTING THE CORRECT ALTERNATE FORM. 0263

Given a line l which contains the point (3,-5) and has slope $\frac{2}{3}$
The point-slope equation of this line is: 0990

a. $y - 3 = \frac{2}{3}(x + 5)$

b. $y - 5 = \frac{2}{3}(x - 3)$

*c. $y + 5 = \frac{2}{3}(x - 3)$

d. $y + 3 = \frac{2}{3}(x + 5)$

e. None of the above

The slope-intercept equation for the line is 0991

a. $y = \frac{2}{3}x + \frac{19}{3}$

*b. $y = \frac{2}{3}x - 7$

c. $y = \frac{3}{2}x - \frac{1}{3}$

d. $y = \frac{3}{2}x + 3$

e. None of the above

The standard equation of this line is 0992

*a. $2x - 3y - 21 = 0$

b. $\frac{2}{3x} + y - 7 = 0$

c. $3x - 2y - \frac{2}{3} = 0$

d. $2x = 3y + 19 = 0$

e. None of the above

Given a line l containing two points (0,1) and (3,7) 0993

The point-slope equation of this line is

a. $y - 1 = \frac{8}{3}x$

b. $y = 2(x-1)$

c. $y = 2x - 1$

*d. $y - 1 = 2x$

e. None of the above

The slope-intercept equation of the line is 0994

*a. $y = 2x + 1$

b. $y = \frac{8}{3}x + 1$

c. $y = 2x - 2$

d. $y = 2x - 1$

e. None of the above

In general form this equation is 0995

a. $8x - 3y + 1 = 0$

b. $2x + y - 1 = 0$

c. $2x - y - 2 = 0$

d. $2x - y - 1 = 0$

*e. None of the above

Given the equation: $4x + 5y - 15 = 0$

Which of the following represents this equation in slope-intercept form? 0996

a. $y = \frac{-5}{4}x - 3$

b. $y = \frac{-4}{5}x - 5$

*c. $y = \frac{-4}{5}x + 3$

d. $y = \frac{-4}{5}x + 15$

e. None of the above

Which of the following represents the equation of a line parallel to the above line and passing through (2, 3)? 0997

a. $y - 3 = 3\ (x-2)$

*b. $y - 3 = \frac{-4}{5}\ (x-2)$

c. $y - 2 = \frac{-4}{5}(x-3)$

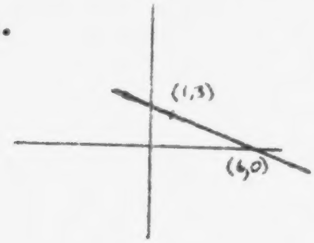
d. $y - 3 = 3\ (x+2)$

e. None of the above

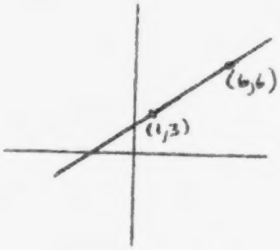
THE STUDENT CAN DEMONSTRATE AN ABILITY TO APPLY THE SLOPE FORMULA BY DETERMINING THE SLOPE OR SECOND POINT WHEN GIVEN TWO POINTS OR A POINT AND SLOPE. 0276

Which of the following graphs is the graph of a line through the point (1,3) with a slope of -3/5? 1346

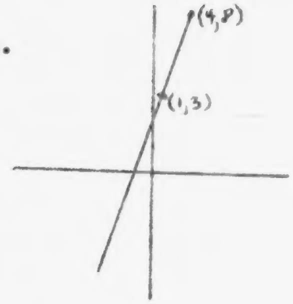
*a.



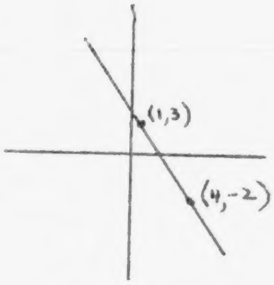
b.



c.



d.



The slope of the line determined by the points (2,-5)and (3,7) is ________. 1347

a. 2/5
b. -12
c. 5/12
*d. +12

THE STUDENT CAN APPLY THE SLOPE FORMULA BY DETERMINING WHICH OF SETS OF THREE POINTS IS COLLINEAR. 0277

Which of the following sets of points are collinear? 1348

*a. (2,5), (8,17), (0,1)
b. (7,5), (-1,-7) (17,19)
c. (-1,2),(2,4), (-3,6)
d. (0,0), (-3,-3) (-3,3)

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE A GIVEN LINEAR EQUATION BY CHOOSING THE CORRECT Y-INTERCEPT. 0279

Which of the following equations has a y-intercept of -5? 1350

a. $x = y - 5$
b. $2y = x = 5$
*c. $2y = x - 10$
d. $2x = y - 10$

THE STUDENT CAN SOLVE PROBLEMS INVOLVING GRAPHING OF LINEAR OPEN SENTENCES, INCLUDING THE SLOPE OF A STRAIGHT LINE, THE SLOPE AND Y INTERCEPT OF A STRAIGHT LINE, AND TWO POINTS ON A STRAIGHT LINE BY SELECTING THE SLOPE, INTERCEPT OR EQUATION. 0325

If a straight line is parallel to the straight line $6x + 2y = 3$, then its slope is 0896

a. -6
*b. -3
c. +6
d. +3
e. none of the above

If given that the slope of a straight line is 4/5, and the intercept is -3, then the equations of the straight line is 089

*a. $5y - 4x + 15 = 0$
b. $5y + 4x + 15 = 0$
c. $5y - 4x + 3 = 0$
d. $5y + 4x - 3 = 0$
e. none of the above

If given the equation $x = -3$, then the slope of the equation is 089

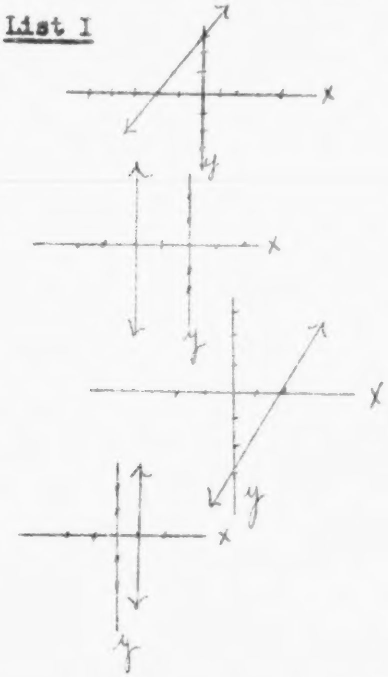
a. -3
b. 0
c. -1
*d. none of the above

If given the equation $y = -3$, then the slope of the equation is 089

a. -3
*b. 0
c. -1
d. none of the above

Match the items in List I with the items in List II.

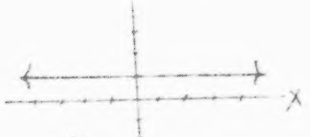
List I



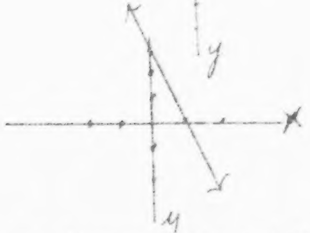
*c 090
*d 090
*c 090
*d 090

List II

a. slope is negative
b. slope is zero
c. slope is positive
d. slope is not defined



*b 0904



*a 0905

If a line goes through the origin point and point (5, -10) then its slope is 0906

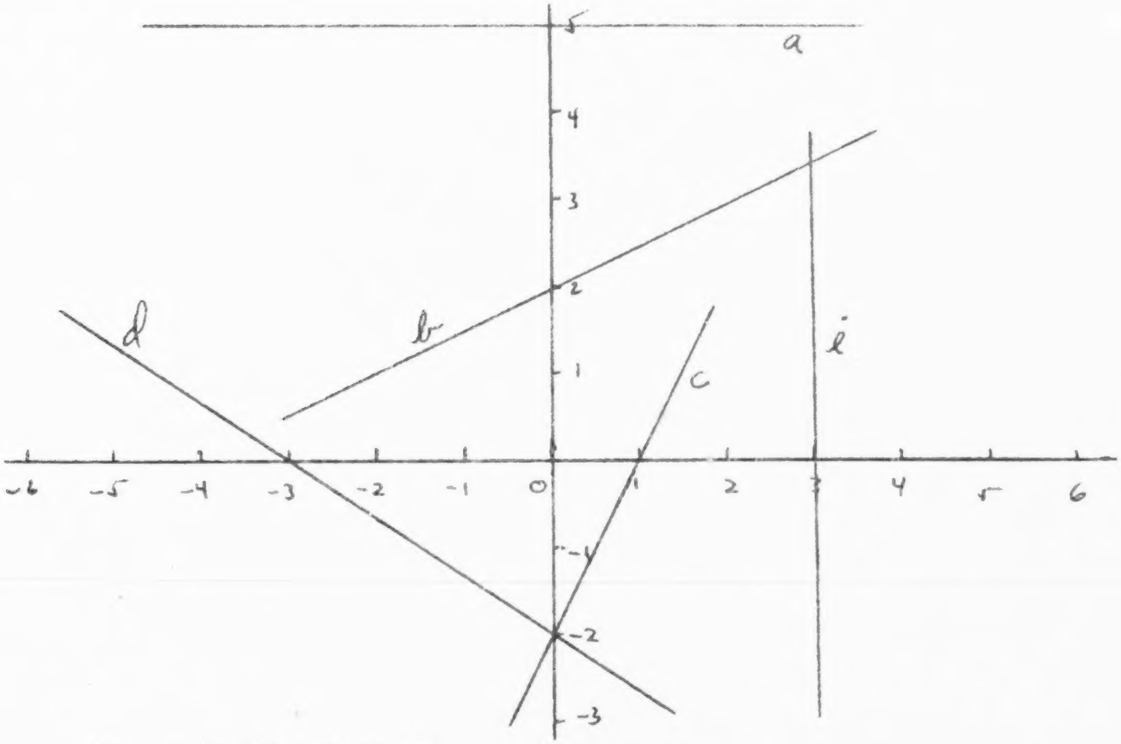
*a. negative
b. positive
c. 4
d. -4
e. none of the above

In the equation y = mx + b, if m does not change but b assumes different values then we may say 0907

a. the straight line will always have a positive slope
b. the straight line will always go through the origin
c. the straight line will intercept the positive part of the y axis
*d. none of the above
e. all of the above

THE STUDENT CAN ANALYZE A COLLECTION OF LINES IN A GRAPH FOR SLOPE BY ASSIGNING TO EACH LINE IT'S NUMERICAL SLOPE. 0405

Directions: In the drawing below associate each line with the given numerical slopes in the next four questions.



*c 2 is the number slope of line __________. 157

*a 0 is the number slope of line __________. 158

*e The number slope of line __________ is undefined. 158

*d -2/3 is the number slope of line ________. 158

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO EVALUATE METHODS FOR DETERMINING THE EQUATION OF A LINE BY SELECTING THE BEST METHOD TO USE TO DETERMINE THE EQUATION OF THE LINE. 061

A line has a slope of 2/3 and it intercepts the y axis at -4. Which method would be the best to use to determine the equation of the line? 2161

a. $Ax + By + C = 0$

b. $\dfrac{y - y_0}{x - x_0} = \dfrac{y_1 - y_0}{x_1 - y_0}$

c. $\dfrac{x}{-C/A} + \dfrac{y}{-C/B}$

*d. $y = -\dfrac{A}{B} x - \dfrac{C}{B}$

e. $\dfrac{y - y_0}{x - x_0} = -\dfrac{A}{B}$

A line has a slope of 2/3 and passes through the point (0, -4). Which method would be the best to use to determine the equation of the line? 2162

a. $Ax + By + C = 0$

b. $\dfrac{y - y_0}{x - x_0} = \dfrac{y_1 - y_0}{x_1 - x_0}$

c. $\dfrac{x}{-C/A} + \dfrac{y}{-C/B} = 1$

d. $y = -A/B(x) - C/B$

*e. $\dfrac{y - y_0}{x - x_0} = -A/B$

A line intersects the y axis at -4 and the x axis at 3. Which method would be the best to use to determine the equation of the line? 216

a. $Ax + By + C = 0$

b. $\frac{y - y_o}{x - x_o} = \frac{y_1 - y_o}{x_1 - x_o}$

*c. $\frac{x}{-C/A} + \frac{y}{-C/B} = 1$

d. $y = -A/B(x) - C/B$

e. $\frac{y - y_o}{x - x_o} = -A/B$

TRIGONOMETRY

THE STUDENT DEMONSTRATES HIS ABILITY TO TRANSLATE THE FUNDAMENTAL IDENTITIES OF TRIGONOMETRY BY SELECTING THE CORRECT ALTERNATIVE FORM FOR A GIVEN EXPRESSION. 0140

Express in terms of sec θ ; $\sin\theta \csc\theta + \dfrac{\sin\theta}{\cos\theta \cot\theta}$ 0381

*a. $\sec^2\theta$

b. $\sec\theta$

c. $\dfrac{1}{\sec\theta}$

d. $1 + \sec^2\theta$

Express in terms of tan θ : $\csc^2\theta\,(\sec^2 - 1)(\sin\theta\cos\theta)$ 0382

a. $\tan^2\theta$

b. $\tan^2\theta - 1$

*c. $\tan\theta$

d. $\dfrac{1}{\tan\theta}$

Express in terms of cos θ : $1 + \tan^2\theta - \dfrac{\sin^2\theta}{\csc^2\theta - 1}$

a. $\dfrac{\cos^2\theta}{1 + \cos^2\theta}$

*b. $2 - \cos^2\theta$

c. $\dfrac{1}{\cos\theta}$

d. $1 + \cos^2\theta$

Express in terms of cos θ: $\sec\theta - \sec\theta\sin^2\theta$ 0384

a. $\cos^2\theta$

b. $1 + \cos^2\theta$

c. $\dfrac{1}{\cos\theta}$

*d. $\cos\theta$

Express in terms of sin θ : $\sec\theta$ 0385

a. $\pm\sqrt{1 - \sin^2\theta}$

b. $\pm\sqrt{\dfrac{1 - \sin^2\theta}{\sin\theta}}$

*c. $\pm\dfrac{1}{\sqrt{1 - \sin^2\theta}}$

d. $\pm\sqrt{\sin^2\theta - 1}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE THE DEFINITIONS AND PROPERTIES OF CIRCULAR FUNCTIONS BY IDENTIFYING THE DEFINITION OR PROPERTY THAT IS USEFUL IN PROVING IDENTITIES. 0600

Which definition or property would be best to use to prove the identity: $\sin 3x + \sin x = 2\sin 2x\cos x$? 2141

a. $\sin 3y = \sin(2x + x)$
*b. $\sin x_1 + \sin x_2 = 2\sin\left(\dfrac{x_1 + x_2}{2}\right)\cos\left(\dfrac{x_1 - x_2}{2}\right)$
c. $\sin 2x = \sin(x + x)$
d. $2\sin 2x\cos x = \sin 3x$
e. $\sin x_1 + \sin x_2 = \sin(x_1 + x_2)$

Which definition or property would not be useful in proving the identity: $\cos x - \tan y \sin x = \sec y \cos(x + y)$ 2142

*a. $\cos^2 x + \sin^2 x = 1$
b. $\cos(x + y) = \cos x \cos y - \sin x \sin y$
c. $\sec y = \dfrac{1}{\cos y}$
d. $\tan y = \dfrac{\sin y}{\cos y}$
e. $\cos x - \dfrac{\sin y \sin x}{\cos y} = \dfrac{\cos x \cos y - \sin y \sin x}{\cos y}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO EVALUATE AN OPEN SENTENCE INVOLVING THE CIRCULAR FUNCTIONS BY SELECTING THE BEST METHOD OF SOLUTION. 0603

Select the best method to use to find the set of particular solutions in the interval $0 \leq x < 2\pi$ for the open sentence $\text{Sin}\,\frac{x}{2} + \text{Cos}\,\frac{x}{2} = \sqrt{2}$ 2147

a. Multiply both members of the equation by 2
b. Square both members of the equation
*c. Add $-\text{Cos}\,\frac{x}{2}$ to both members and then square both members of the equation
d. Use as the first step: $\text{Sin}^2\frac{x}{2} + \cos^2\frac{x}{2} = 2$, then change $\text{Cos}^2 x/2$ in terms of $\text{Sin}\, x/2$
e. Factor out $x/2$ first, then square both members of the equation.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO EVALUATE THE USE OF THE CIRCULAR FUNCTIONS OF TWO ANGLES BY SELECTING THE BEST METHOD OF SOLUTION FOR A PROBLEM. 0611

Which is the best method of solution for finding $\sin 75^\circ$? 2164

a. find $\sin\,(90 - 15)^\circ$
b. find $\sin\,(30 + 45)^\circ$
*c. find $\sin\,(150)^\circ$
d. find $\cos 15^\circ$
e. find $\sin 2(75)^\circ$

Which is the best method of solution for finding cos 210°? 2165

- a. Find cos 2(105)
- b. Find $\cos\frac{1}{2}(420)$
- c. Find cos (90 + 120)
- *d. Find cos (270 - 60)
- e. Find cos (150 + 60)

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE ADDITION AND DIFFERENCE FORMULAS FOR THE CIRCULAR FUNCTIONS BY SOLVING PROBLEMS USING THESE FORMULAS. 0612

cos A cosB - sinA sinB should be used to calculate Value of 2166

- a. sin (60 - 45)
- *b. cos (45 + 30)
- c. sin (45 + 30)
- d. cos (60 - 45)
- e. cos (75 + 25

sin A cos B + cos A sin B should be used to calculate value of: 2167

- *a. sin 105
- b. cos 105
- c. sin 15
- d. cos 15
- e. sin 90

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE VALUES OF CIRCULAR FUNCTIONS FOR SPECIAL VALUES OF X ($\pi/2, \pi/3, \pi/6, \pi/4$, ETC.) BY SOLVING PROBLEMS WHICH CONTAIN FUNCTIONS OF THESE VALUES. 0613

Evaluate $4\sin 30^\circ - 8\tan 45^\circ + 10\cos 60^\circ$. 2168

- a. $3 - 4\sqrt{2}$
- b. $7\sqrt{3} - 4\sqrt{2}$
- c. $2 - 4\sqrt{2} + 5\sqrt{3}$
- *d. -1
- e. $-\frac{1}{2}$

Which of the following are not true? 2169

a. $\sin \pi/3 = \cos \pi/6$
b. $\tan \pi/4 = \text{ctn}\, \pi/4$
*c. $\sec \pi/3 = \cos \pi/6$
d. $\sin \pi/4 = \cos \pi/4$
e. $\tan \pi/3 = \text{ctn}\, \pi/6$

Find the Value for θ between 0 and 2π that satisfies the equation $\sin = \frac{1}{2}$. 2170

*a. $\pi/6$
b. $\pi/3$
c. $\pi/2$
d. $\pi/4$

Which expression differs in value from the others: 2171

a. $\sin^2 \pi/3 + \cos^2 \pi/3$
*b. $\sec^2 \pi/2 + \cos^2 \pi/2$
c. $\csc^2 \pi/4 - \text{ctn}^2\, \pi/4$
d. $\tan^2 \pi/6 \cdot \text{ctn}^2\, \pi/6$
e. $\sec^2 2\pi/3 - \tan^2 2\pi/3$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY HIS KNOWLEDGE OF THE CIRCULAR FUNCTIONS OF TWO ANGLES BY SELECTING THE CORRECT FORMULA TO BE USED IN VERIFYING AN IDENTITY. 0614

The identity $\sin(\pi + x) = -\sin x$ can be verified by using 2172

*a. sinA cosB + cosA sinB
b. cosA cosB - sinA sinB
c. sinA cosB - cosA sinB
d. cosA cosB + sinA sinB

Which of the following would not be used to verify the identity 2173
$\tan(A + B) = \frac{\tan B - \tan A}{1 + \tan A \tan B}$

a. $\sin A \cos B + \cos A \sin B$
b. $\tan x = \frac{\sin x}{\cos x}$
c. $\cos A \cos B - \sin A \sin B$
*d. $\tan x = \frac{1}{\operatorname{ctn} x}$

e. $\tan^2 x = \sec^2 x - 1$

Which of the following would not be used to verify the identity: 2174
$\operatorname{ctn}(A + B) = \frac{\operatorname{ctn} A \operatorname{ctn} B - 1}{\operatorname{ctn} A + \operatorname{ctn} B}$

*a. $\operatorname{ctn}^2 x = \csc^2 x - 1$

b. $\operatorname{ctn} x = \frac{1}{\tan x}$

c. $\operatorname{ctn} x = \frac{\cos x}{\sin x}$

d. $\sin A \cos B + \cos A \sin B$

e. $\cos A \cos B - \sin A \sin B$

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE PRINCIPAL VALUES OF INVERSE FUNCTIONS OF CIRCULAR FUNCTIONS BY SELECTING THE VALUE OF A FUNCTION. C618

The principal value of arc Tan (+1) is 2187

a. $\pi/3$
*b. $\pi/4$
c. $\pi/2$
d. $3\pi/4$
e. $\pi/6$

The value of cos(arc tan 1) is 2188

a. $\sqrt{3}/2$
b. $1/2$
*c. $\sqrt{2}/2$
d. $2/\sqrt{3}$
e. 1

The value of ctn(arc tan 3) is 2189

a. 3
*b. $1/3$
c. $\sqrt{3}$
d. 1
e. $1/\sqrt{3}$

THE STUDENT CAN CHOOSE THE BEST DESCRIPTION OF THE TANGENT GRAPH FROM A LIST, THUS DEMONSTRATING KNOWLEDGE OF THIS FUNCTION. 0298

Which best describes the behavior of the tangent function in the interval $\left\{\alpha \mid \frac{3}{2}\pi < \alpha \le 2\pi\right\}$? 1383

*a. $\tan\alpha \le 0$

b. $\tan\alpha < 0$

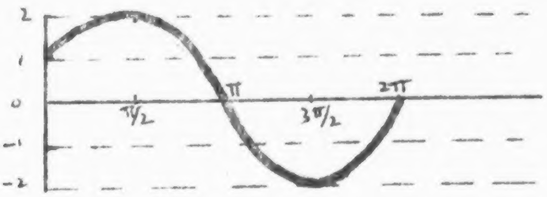
c. $\tan\alpha > 0$

d. $\tan\alpha \geq 0$

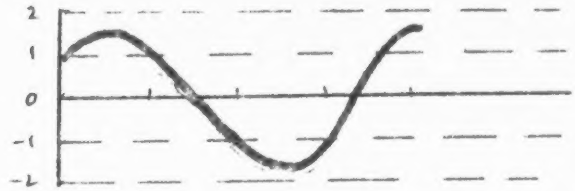
THE STUDENT WILL BE ABLE TO GRAPH RELATIONS DEFINED BY UNFAMILIAR COMBINATIONS OF THE SINE TRIGONOMETRIC FUNCTIONS GRAPH BY SELECTING THE CORRECT GRAPH FOR A GIVEN FUNCTION. 0355

Which of the following represents the graph of F if F = $\{(x, f(x) \mid f(x) = \sin x + \cos x\}$ 1059

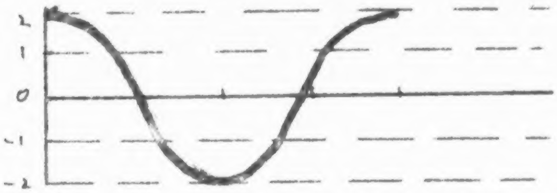
a.



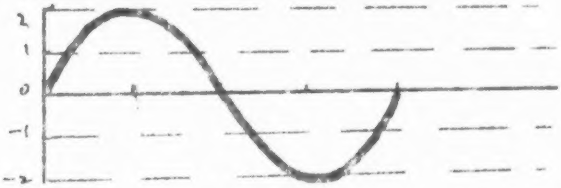
*b.



c.



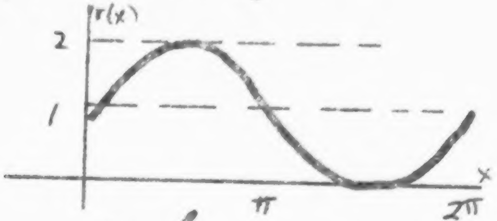
d.



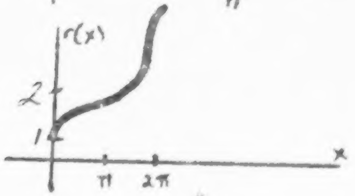
e. None of the above

Which of the following represents the graph of R if R = $\{(x, r(x) | r(x) = x + \sin x\}$ 1060

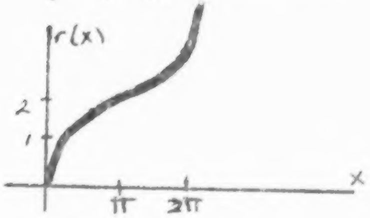
a.



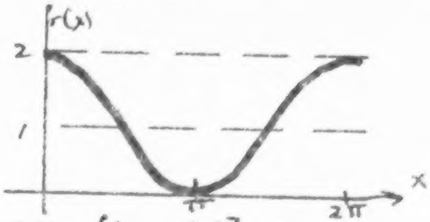
b.



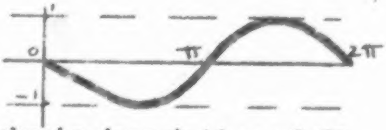
*c.



d.



The graph of F = $\{(x, f(x)\}$ is 1061



Which of the following is the best algebraic description of F?

a. $F = \{(x, f_{(x)}) \mid f(x) = (\sin(-x)\}$
b. $F = \{(x, f_{(x)}) \mid f(x) = \sin(\pi - x)\}$
*c. $F = \{(x, f_{(x)} \mid f(x) = -\sin x\}$
d. None of the above

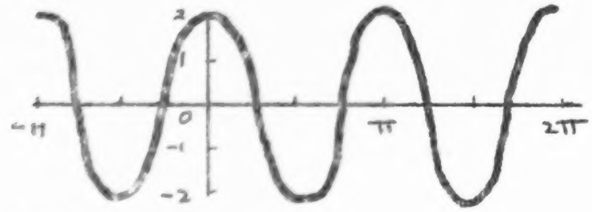
Consider the period of $F = \{(x, f(x) \mid f(x) = \sin nx, n \in R\}$ 1062

A formula for the period of F, given n is

- *a. Period = $\frac{2\pi}{n}$
- b. Period = $\frac{n}{2\pi}$
- c. Period = $2\pi(n)$
- d. Period = $\frac{\pi n}{2}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO INTERPRET A GIVEN GRAPH BY STATING THE EQUATION IN TERMS OF A VARIATION OF A CIRCULAR FUNCTION. 0604

The graph



can be identified with the equation: 2148

- a. $y = 2\cos(2\theta + \pi)$
- b. $y = 2\cos(2\theta - \pi)$
- *c. $y = 2\cos(2\theta)$
- d. $y = 2\cos(\theta - \pi)$
- e. $y = 2\cos(\theta + \pi)$

The equation $y = 3\sin(2\theta + \pi/2)$ is NOT identified as: 2149

- a. Having an amplitude of 3
- *b. Having a phase shift to the right
- c. Having a phase shift to the left
- d. Having a period of π
- e. Having 1 cycle in π units.

What property do the following graphs have in common? 2150

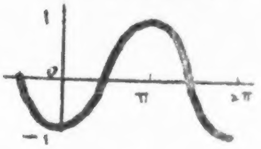


Fig. 1

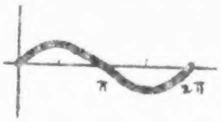


Fig. 2

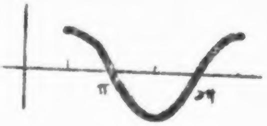


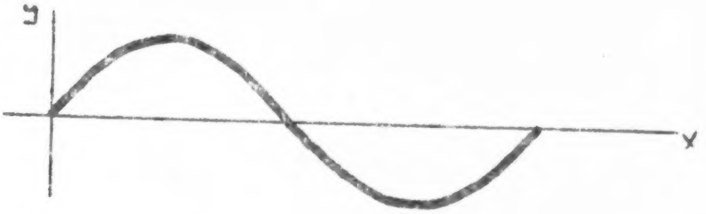
Fig. 3

a. Same Phase shift
b. Same Amplitude
*c. Same Period
d. Same Function

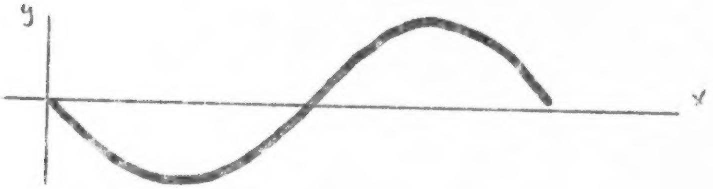
THE STUDENT WILL DEMONSTRATE HIS COMPREHENSION OF THE GRAPHS OF CIRCULAR FUNCTIONS BY PREDICTING THE CORRECT GRAPH OF A VARIATION OF A CIRCULAR FUNCTION. 0615

Using the graph of sin X, predict the graph of sin (-x). 2175

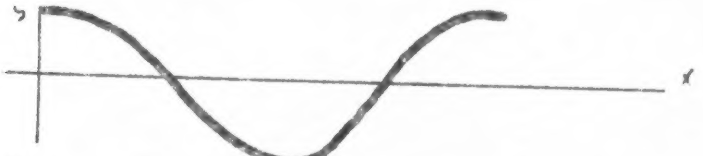
a.



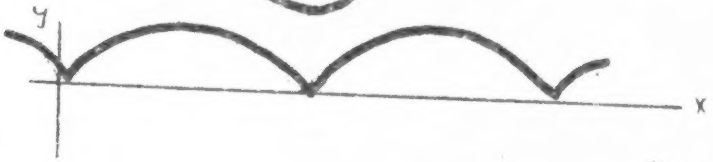
*b.



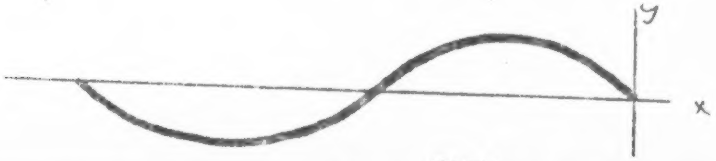
c.



d.

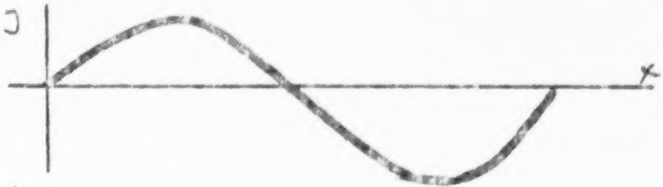


e.

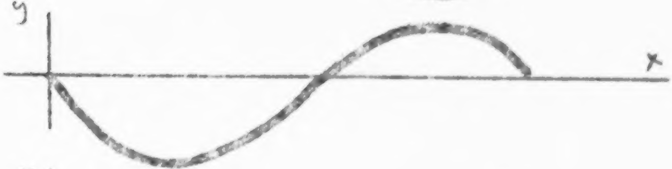


Using the graph of Sin x, Predict the graph of -Sin x. 2176

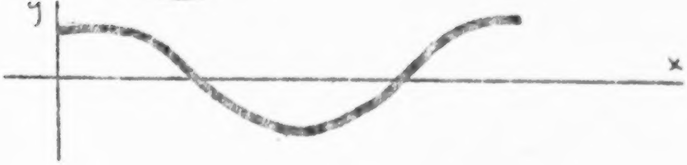
a.



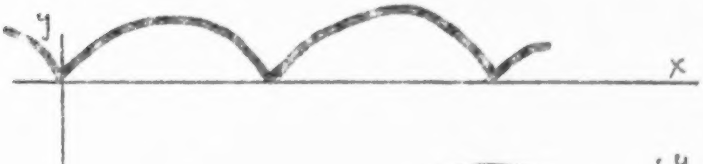
*b.



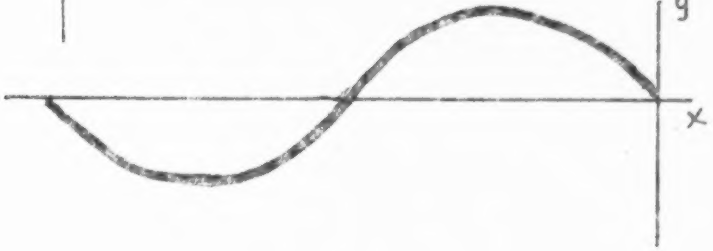
c.



d.

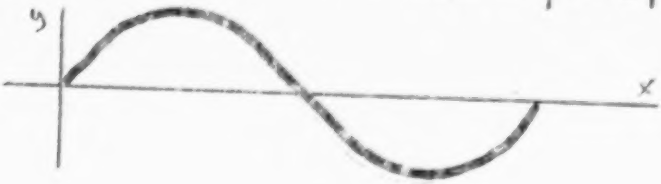


e.

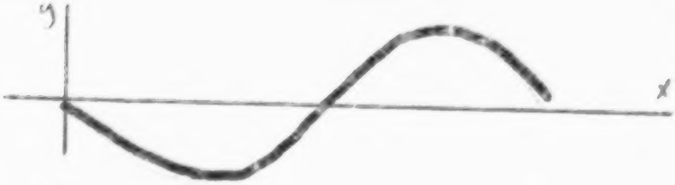


Using the graph of sin x predict the graph of $|\sin x|$ 2177

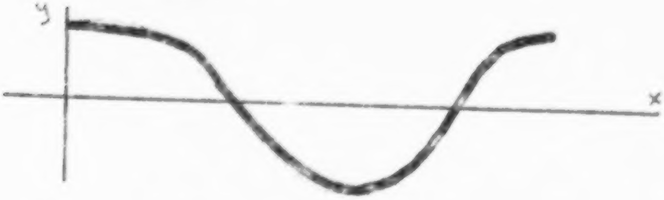
a.



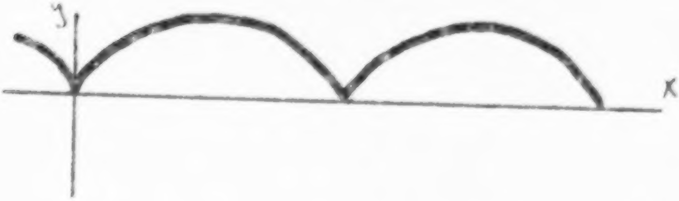
b.



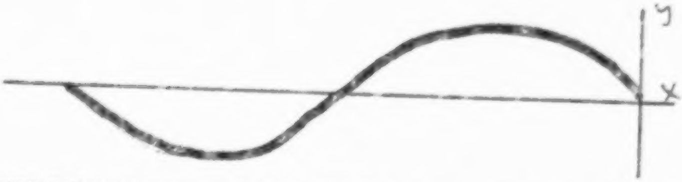
c.



*d.



e.



THE STUDENT DEMONSTRATES HIS ABILITY TO USE TABLES OF TRIGONOMETRIC FUNCTIONS IN THE PROCESS OF INTERPOLATION BY CHOOSING THE CORRECT TABLE VALUE FOR A GIVEN FUNCTION. 0133

Find the value of the sin 15° 12′ to four significant figures. 0361

*a. .2622
b. .2625
c. .2620
d. .2618

Find the value of the csc $10^\circ\ 14'$ to four significant figures. 0362

a. 5. 623
b. 5. 620
c. 5. 625
d. 5. 629

THE STUDENT CAN SELECT THE RANGE OF A TRIGONOMETRIC FUNCTION DEMONSTRATING KNOWLEDGE OF DEFINITIONS OF RANGE AND OF THE TRIGONOMETRIC FUNCTIONS. 0290

Which best describes the range of f (x) = a sin bx? 1370

a. $\{y \mid -1 \leq y \leq 1\}$

b. $\{y \mid y = 2\pi\}$

c. $\{y \mid y = \frac{2\pi}{b}\}$

*d. $\{y \mid -a \leq y \leq +a\}$

THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF THE TRIGONOMETRIC FUNCTIONS, SIN, COS, SEC, CSC, TAN, COT, BY CHOOSING THE VALUE OF A SECOND FUNCTION GIVEN THE VALUE OF A FIRST. 0131

If the tangent of an angle in the first quadrant is $\frac{4}{7}$ what is the sin θ of the angle? 0351

a. $\sin\theta = \frac{7}{4}$

b. $\sin\theta = \frac{2}{1}$

*c. $\frac{4}{\sqrt{65}} = \frac{4\sqrt{65}}{65}$

d. $\frac{7}{8}$

In what quadrants may an angle θ terminate if the sin θ is positive? 0352

a. 2nd quadrant
b. third quadrant
c. 2nd and 3rd quadrant
*d. 1st and 2nd quadrant

What is the sin θ, given cos θ = $-\frac{4}{5}$ and that tan θ is positive? 0353

a. $\frac{3}{5}$
b. 1
*c. $-\frac{3}{5}$
d. ∅

Find the csc θ given sin θ = $\frac{\sqrt{3}}{2}$ 0354

a. ½
*b. $\frac{2\sqrt{3}}{3}$
c. $\frac{\sqrt{3}}{1}$
d. $\frac{\sqrt{3}}{2}$

Find sec θ if cos θ = $-\frac{1}{2}$ 0355

*a. -2
b. $\frac{\sqrt{3}}{1}$
c. $\frac{2}{\sqrt{3}}$
d. $\frac{\sqrt{3}}{2}$

Find the tan θ given cos $\theta = \frac{5}{6}$ 0356

a. $\pm\frac{6}{\sqrt{11}}$

b. $\pm\frac{\sqrt{11}}{6}$

c. $\pm\frac{5\sqrt{11}}{11}$

*d. $\pm\frac{\sqrt{11}}{5}$

THE STUDENT DEMONSTRATES HIS ABILITY TO TRANSLATE THE TRIGONOMETRIC FUNCTIONS OF SPECIAL ANGLES, 30°, 60°, 45° BY CHOOSING THE CORRECT EVALUATION FOR A MIXED EXPRESSION. 0132

Evaluate $\sin 30^\circ + \cos 45^\circ - \sin 45^\circ$. 0357

a. $\frac{1 + 2\sqrt{2}}{2}$

b. $\frac{1 + \sqrt{2}}{2}$

*c. $\frac{1}{2}$

d. $2\sqrt{2}$

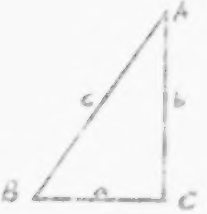
Evaluate $6 \cos 45^\circ + \sin 30^\circ - \sin 60^\circ$. 0358

a. $\frac{3\sqrt{2} + 1}{2}$

b. $\frac{\sqrt{3} + 1}{2\sqrt{2}}$

c. $\frac{3\sqrt{2}}{2}$

*d. $\frac{6\sqrt{2} - \sqrt{3} + 1}{2}$



Use the figure at the left to answer the following two questions.

Find b if $a = \frac{4\sqrt{3}}{3}$ and $m\angle A = 30^\circ$, and $m\angle C = 90^\circ$ 0359

a. $\frac{1}{2}$

b. $\frac{3}{4}$

*c. 4

d. $\frac{4}{3}$

Find tan A if a = 3 and c = 7 0360

a. $\frac{2\sqrt{10}}{3}$

*b. $\frac{3\sqrt{10}}{20}$

c. $\frac{7}{3}$

d. $\frac{7}{2\sqrt{10}}$

THE STUDENT WILL BE ABLE TO TRANSLATE TRIGONOMETRIC IDENTITIES BY INDICATING CORRECT ALTERNATE FORMS. 0352

In order to verify the identity $\sin^2 \theta\ (1+\cot^2 \theta) = 1$, I will first 1056

a. multiply the factors in the left hand member
b. substitute $(1-\cos^2\theta)$ for $\sin^2 \theta$
*c. substitute $(\csc^2 \theta)$ for $(1+\cot^2 \theta)$
d. divide both members by $\sin^2 \theta$
e. none of the above

Which of the following is NOT an acceptable substitution for $\cos 2\theta$? 1057

a. $\cos^2 \theta - \sin^2 \theta$

b. $1 - 2\sin^2 \theta$

c. $2\cos^2 \theta - 1$

*d. $\frac{1}{\sec 2\theta}$

e. none of the above

THE STUDENT WILL BE ABLE TO ANALYZE TRIGONOMETRIC OPERATIONS BY INDICATING UNACCEPTABLE STEPS IN THE VERIFICATION OF IDENTITY 0354

Which of the following is NOT an acceptable operation in the procedure to verify the identity $\csc^2 \frac{\theta}{2} = \frac{2\sec \theta}{\sec\theta - 1}$? 1058

*a. multiply both members by $(\sec \theta - 1)$

b. multiply right member by $\frac{\sec \theta + 1}{\sec \theta + 1}$

c. substitute $(1 + \cot^2 (\theta/2))$ for $\csc^2 \frac{\theta}{2}$

d. substitute $\sqrt{\frac{2}{1 + \cos \theta}}$ for $\csc^2 \frac{\theta}{2}$

e. all of the above are acceptable

THE STUDENT WILL BE ABLE TO DEMONSTRATE UNDERSTANDING OF INVERSES BY DESCRIBING THEM IN SET LANGUAGE AND GRAPHING THE INVERSES OF THE TRIGONOMETRIC FUNCTIONS. 0362

If $Q = \{(x,q(x)) | q(x) = \sin x\}$ then the inverse relation, Q^{-1}, is identified as 1097

a. $Q^{-1} = \{(x,q(x) | x = \sin q \}$

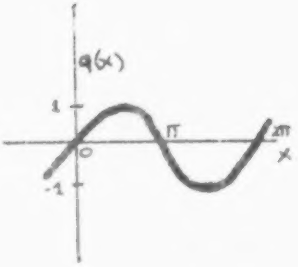
*b $Q^{-1} = \{(q(x),x) | q(x) = \sin x \}$

c. $Q^{-1} = \{(x.q(x) | q(x) = \frac{1}{\sin x} \}$

d. all of the above

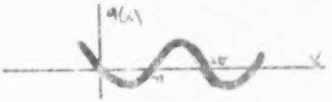
e. none of the above

The graph of $Q = \{(x, q(x) \mid q(x) = \sin x\}$ is 1098

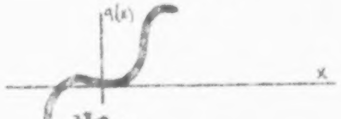


The graph of the inverse of Q, or Q^{-1}, is

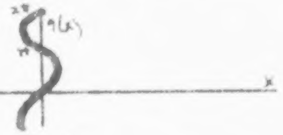
a.



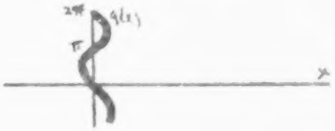
b.



*c.



d.



e. none of the above

To produce the graph of the inverse of a function in the x, y plane one should 1099

*a. translate through the line $y = x$
b. rotate clockwise through an angle of $\frac{\pi}{2}$
c. exchange the x and y axis
d. graph the reciprocal of the function
e. none of the above

THE STUDENT WILL BE ABLE TO ANALYZE EQUATIONS WHOSE TERMS ARE INVERSE TRIGONOMETRIC FUNCTIONS BY SELECTING THE SOLUTION SET. 0363

The statement $\cos^{-1}x + \sin^{-1}x = \frac{\pi}{2}$ is true for 1100

*a. all real values of x
b. $x = \frac{\pi}{4}$
c. $x = \frac{\pi}{2}$
d. $0 \leq x \leq \frac{\pi}{2}$
e. none of the above

If Sin^{-1} 2 + Tan^{-1} 3 = x, then 1101

a. $x = \frac{\pi}{2}$

b. $x = \frac{3\pi}{2}$

c. $x = \frac{\pi}{3}$

*d. none of the above

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS KNOWLEDGE OF INVERSE TRIGONOMETRIC FUNCTIONS BY SOLVING EQUATIONS CONTAINING INVERSE FUNCTIONS. 0545

The solution set for x in $\mathrm{Sin}^{-1}(\mathrm{Cos}^{-1} x) = 0$ is 1988

a. $\{0\}$
*b. $\{1\}$
c. $\{\pi/2\}$
d. $\{0,1\}$

The solution set for x in $3\ \mathrm{Sin}^{-1} x = \pi/2$ is 1989

*a. $\{1/2\}$
b. $\{-1/2\}$
c. $\{\pi/6\}$
d. $\{-\pi/6\}$

The solution set for x in $\mathrm{Cos}^{-1} 2x + \mathrm{Cos}^{-1} x = \frac{\pi}{3}$ is 1990

a. $\{\pm 1/2\}$
*b. $\{1/2\}$
c. $\{-1/2\}$
d. $\{\pi/6\}$
e. $\{\pi/3\}$

THE STUDENT DEMONSTRATES HIS KNOWLEDGE OF THE TRIGONOMETRIC FUNCTIONS OF TWO ANGLES BY CHOOSING THE CORRECT VALUE OF A GIVEN FUNCTION. 0143

If $\theta = 30^\circ$ find $\tan \frac{1}{2} \theta$ 0391

a. -2
b. $\frac{\sqrt{3}}{2}$
c. $\sqrt{2}$
*d. $2 - \sqrt{3}$

Simplify $\sin(45^\circ + \theta) - \sin(45^\circ - \theta)$ 0392

*a. $\sqrt{2} \sin \theta$
b. $2 \cos \theta$
c. $\sqrt{2} \cos \theta$
d. $2 \sin \theta$

Using the half angle formula find the exact value of $\sin 15^\circ$ 0393

a. $\frac{1}{2}\sqrt{2}$
b. $\sqrt{3}$
*c. $\frac{1}{2}\sqrt{2 - \sqrt{3}}$
d. $\frac{1}{2}\sqrt{2 + \sqrt{2}}$

Find the value of $\cos \frac{1}{2} \theta$ if $\cos \theta = \frac{3}{7}$, θ in 4th quadrant. 0394

a. $5\sqrt{26}$
b. $\frac{\sqrt{10}}{5}$
c. $\frac{26}{\sqrt{26}}$
*d. $\frac{-\sqrt{5}}{\sqrt{7}}$ or $-\frac{\sqrt{35}}{7}$

Simplify : $\cos (45 - \theta) + \cos (45^\circ + \theta)$ 0395

a. $\sqrt{2} (\cos \theta - \sin \theta)$

*b. $\sqrt{2} \cos \theta$

c. $2 \cos \theta \sin \theta$

d. $\sqrt{2} \sin \theta$

If $\theta = 30^\circ$ find $\tan 2 \theta$ 0396

a. $\frac{2\sqrt{3}}{3}$

b. $\frac{\sqrt{3}}{3}$

*c. $\frac{\sqrt{3}}{2}$

d. $3\sqrt{3}$

Using $15^\circ = (60 - 45)$ find $\tan 15^\circ$ 0397

*a. $2 - \sqrt{3}$

b. $\sqrt{2}$

c. -2

d. $\frac{\sqrt{3}}{2}$

Evaluate $\tan (60^\circ - 30^\circ)$ 0398

a. $\frac{2\sqrt{3}}{3}$

b. 3

*c. $\frac{\sqrt{3}}{3}$

d. $3\sqrt{3}$

THE STUDENT DEMONSTRATES HIS ABILITY TO APPLY THE FORMULAS FOR SUMS AND DIFFERENCES OF ANGLES BY CHOOSING THE CORRECT EXPANSION FOR A GIVEN FUNCTION AND ANGLE. 0292

Which of the following expressions best represent Cos 15° expressed in terms of 45° and 30° ? 1373

*a. $\cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ$

b. $\sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ$

c. $\cos 45^\circ \cos 30^\circ - \sin 45^\circ \sin 30^\circ$

d. $\sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ$

THE STUDENT DEMONSTRATES HIS ABILITY TO APPLY THE LAW OF COSINES AND THE LAW OF SINES BY SELECTING THE UNKNOWN QUANTITY OF A GIVEN TRIANGLE.. 0144

Find side c of triangle ABC if side $a = 3$, side $b = 2$ and the angle between side b and side a measures 60°. 0399

*a. $c = \sqrt{7}$
b. $c = 1$
c. 7
d. 21

Find the measure of angle A to the nearest degree, if in $\triangle$ ABC $a = 4$, $b = 5$ and the measure of angle B is 60°. 0400

a. 20°

b. 30°

*c. 44°

d. 48°

Find the perimeter of a regular pentagon inscribed in a circle of radius 12 inches. 0401

a. 63 inches
b. 75 inches
c. 65 inches
*d. 71 inches

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE TRIANGLES BY USE OF THE LAW OF COSINES AND THE LAW OF SINES WHEN HE CHOOSES THE VALUE OF A GIVEN SIDE OR ANGLE. 0293

For triangle ABC if $\angle A$, side b, and side a are given, then angle B = ________. 1374

*a. $\sin^{-1} \dfrac{b \sin A}{a}$

b. $\sin^{-1} \dfrac{a}{b \sin A}$

c. $\sin^{-1} a\, b \sin A$

d. $\sin^{-1} \dfrac{ab}{\sin A}$

For $\triangle$ABC, if side a, side b, and side c are given, then B = ________. 1375

a. $\cos^{-1} \dfrac{a^2 + b^2 - c^2}{2ab}$

b. $\cos^{-1} \dfrac{b^2 + c^2 - a^2}{2bc}$

c. $\cos^{-1} \dfrac{b^2 - a^2 - c^2}{2ac}$

*d. $\cos^{-1} \dfrac{a^2 + c^2 - b^2}{2ac}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY THE LAW OF LINES IN THE SOLUTION OF AN OBLIQUE TRIANGLE BY CHOOSING THE CORRECT MEASURE FOR A GIVEN SIDE. 0351

In △ ABC, if the measures of ∠ A, ∠ B and side AC are known, a correct expression for BC is 1051

a. $BC = \frac{(AC) \text{ Sin } B}{\text{Sin } A}$

b. $BC = (AC) \text{ Sin } A$

*c. $BC = \frac{(AC) \text{ Sin } A}{\text{Sin } B}$

d. $\frac{BC}{\text{Sin } A} = \frac{AC}{\text{Sin } B}$

e. None of these

In △ PQR, when given the measures of ∠ P, p and r, use of the Law of Sines will provide an expression for the measure of 1052

a. q
b. Q
*c. R
d. all of the above
e. none of the above

Find the measure of side a in △ ABC when the measures of ∠ A, ∠ C and side b are known. 1053

*a. $a = \frac{b \text{ Sin } A}{\text{Sin } B}$

b. $c = \frac{b \text{ Sin } C}{\text{Sin } B}$

c. $a = \frac{b \text{ Sin } C}{\text{Sin } B}$

d. $\frac{c}{\text{Sin } C} = \frac{b}{\text{Sin } B}$

e. None of the above

In △STP, if the measures of ∠ S, ∠ T and side t are known, a correct expression for the measure of side s is 1054

a. $\frac{s}{\text{Sin } S} = \frac{t}{\text{Sin } T}$

*b. $s = \frac{t \text{ Sin } S}{\text{Sin } T}$

c. $s = t \text{ Sin } S$

d. $s = \frac{t \text{ Sin } T}{\text{Sin } S}$

d. None of the above

In △DEF, the measures of ∠ D, e, and f are known. The Law of Sines can be used to find the measure of 1055

a. E
b. d
c. F
d. all of the above
*e. none of the above

THE STUDENT WILL BE ABLE TO APPLY THE LAW OF COSINES IN THE SOLUTION OF AN OBLIQUE TRIANGLE BY CHOOSING THE CORRECT MEASURE OF A GIVEN SIDE OR ANGLE. 0353

In triangle ABC, the measures of ∠A, b, and c are known. An expression for the measure of side a is 1043

a. $a^2 = b^2 + c^2 - 2bc \text{ Cos } A$

b. $a = \frac{b \text{ Cos } A}{\text{Cos } B}$

*c. $a = \sqrt{b^2 + c^2 - 2bc \text{ Cos } A}$

d. None of the above

In triangle PQR, the measures of ∠P, q and r are known. The Law of Cosines can be used to find the measure of 1044

a. ∠Q
b. ∠R
*c. p
d. all of the above
e. none of the above

In △DEF, the measures of d, e, and f are known, An expression for the measure of ∠D is 1045

a. $\text{Cos } D = \frac{e^2 + f^2 - d^2}{2ef}$
*b. $D = \cos^{-1} \left(\frac{e^2 + f^2 - d^2}{2ef}\right)$
c. $d^2 = e^2 + f^2 - 2ef \text{ Cos } D$

d. None of the above

Directions: Given the information in each of the following, decide which method below would enable you to solve the triangle most readily.

A. Law of Cosines
B. Law of Sines
Circle either A or B for each statement.

*A B Two sides and the included angle 1046

A *B Two sides and an angle opposite one of them 1047

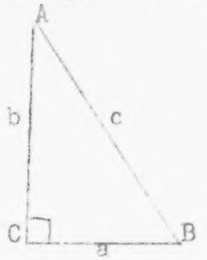
A *B Two angles and an included side 1048

A *B Two angles and a side opposite one of them 1049

*A B Three sides 1050

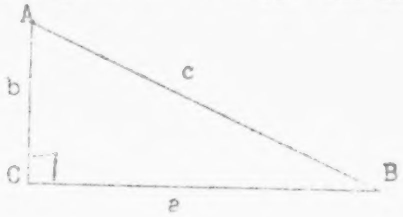
GIVEN A RIGHT TRIANGLE ABC, THE LENGTH OF ONE SIDE, AND THE MEASURE OF ONE ACUTE ANGLE, THE STUDENT DEMONSTRATES HIS ABILITY TO FIND THE LENGTH OF THE REMAINING ACUTE ANGLE BY CHOOSING THE CORRECT VALUE OF THE OPPOSITE SIDE. 0134

Find the length of side b given M A = 32° and side c length of 8. 0363



a. 6. 12
b. 7. 32
*c. 6. 78
d. 7. 12

Find the length of side b given M B = 35° and side c length of 12. 0364



*a. 6.88
b. 7.21
c. 6.52
d. 7.11

GIVEN AN ANGLE TERMINATING IN ONE OF THE QUADRANTS, AND GIVEN THE VALUE OF ONE OF THE TRIGONOMETRIC FUNCTIONS, THE STUDENT DEMONSTRATES HIS ABILITY TO USE THE FUNDAMENTAL IDENTITIES TO FIND VALUES OF OTHER FUNCTIONS OF AN ANGLE BY CHOOSING THE VALUE GIVEN THE QUADRANT AND THE VALUE OF ONE FUNCTION OF THE ANGLE. 0141

If θ terminates in the first quadrant and $\sin \theta = \frac{4}{5}$ find $\tan \theta$. 0386

a. $\tan \theta = \frac{4}{5}$
*b. $\tan \theta = \frac{4}{3}$
c. $\tan \theta = \frac{3}{4}$
d. $\tan \theta = \frac{5}{3}$

Find $\sin \theta$ if θ terminates in the 3rd quadrant and $\tan \theta = 2$. 0387

*a. $-\frac{2}{\sqrt{5}} = \sin \theta$
b. $\frac{2\sqrt{5}}{5} = \sin \theta$
c. $-\frac{1}{\sqrt{5}} = \sin \theta$
d. $\frac{\sqrt{3}}{5} = \tan \theta$

Find the cos θ if θ terminates in the 3rd quadrant and tan $\theta = \frac{5}{12}$ 0388

a. $\frac{-5}{13} = \cos\theta$

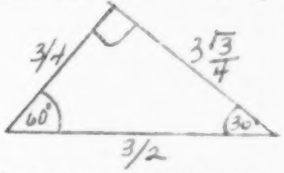
*b. $-\frac{12}{13} = \cos\theta$

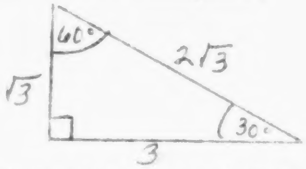
c. $\frac{12}{5} = \cos\theta$

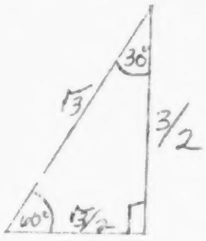
d. $\frac{12}{13} = \cos\theta$

THE STUDENT WILL ANALYZE EXAMPLES OF THE 30°, 60°, 90° TRIANGLE AND THE 45°, 45°, 90° TRIANGLE BY CHOOSING CORRECT RELATIONSHIPS BETWEEN THE SIDES. 0164

Directions: Study these three examples:







Find the relationship between the longer leg (side opposite 60° angle) and the shorter leg. 0538

a. longer leg is 3 · times the shorter leg
b. shorter leg is 3 · longer leg (· means "times the")
c. shorter leg is ½ · longer leg
*d. longer leg is $\sqrt{3}$ · shorter leg
e. no definite relationship exists

Find the relationship between the shorter leg and the hypotenuse. 0539

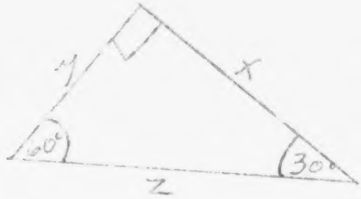
*a. shorter leg is ½ · hypotenuse
b. hypotenuse is 3 · shorter leg
c. hypotenuse is 2 · shorter leg
d. hypotenuse is ½ · shorter leg
e. two of the above
f. no definite relationship exists

Find the measurement of x if the hypotenuse is $\frac{7}{2}$ 0540

*a. $x = \frac{7}{4}\sqrt{3}$

b. $x = \frac{7}{2}$

c. $x = 7\sqrt{3}$



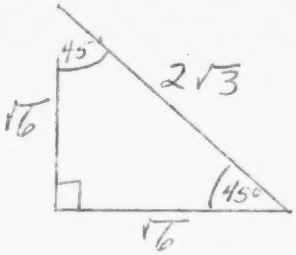
Find the relationship between the leg of the triangle and the hypotenuse. 0541

a. leg is $\sqrt{3}\cdot$ hypotenuse

*b. hypotenuse is $\sqrt{2}\cdot$ leg

c. hypotenuse is $\frac{1}{3}\cdot$ leg

d. no definite relationship exists



THE STUDENT DEMONSTRATES HIS UNDERSTANDING OF THE TANGENT FUNCTION IN A PROBLEM OTHER THAN EVALUATING THE TANGENT OF A SPECIFIC ANGLE BY FINDING AN ANGLE SOLUTION FOR A GIVEN TANGENT FUNCTION EQUATION. 0294

Which of the following is the value of α such that the tangent of α is equal to its own reciprocal? 1376

a. 30°

*b. 45°

c. 60°

d. 90°

THE STUDENT DEMONSTRATES HIS UNDERSTANDING THE TRIGONOMETRIC FUNCTIONS OF ANGLES WHOSE MEASURES ARE 0°, 30°, 45°, 90° BY CHOOSING THE VALUES FOR GIVEN FUNCTIONS OF THESE ANGLES. 0297

Which of the following is equal to the sin 30°. 1382

a. $\sqrt{3}/2$

b. $\frac{1}{\sqrt{3}}$

*c. 1/2

d. $\frac{2}{\sqrt{3}}$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY THE PROPERTIES OF TRIGONOMETRIC FUNCTIONS BY SELECTING THE PROPERTY TO USE IN FINDING TRIGONOMETRIC FUNCTIONS VALUES OF ANGLES OTHER THAN THE "SPECIAL ANGLES" 0601

Which property should be used to find tan $22\frac{1}{2}^\circ$? 2143

a. tan $(A + B)$
b. tan $(A - B)$
*c. tan $(A/2)$
d. tan $2A$

Which property could not be used to find sin 75° ? 2144

*a. sin $2A$
b. sin $A/2$
c. sin $(A + B)$
d. sin $(A - B)$

THE STUDENT WILL BE ABLE TO APPLY THE REDUCTION FORMULAS TO SELECT FUNCTIONS OF ANGLES WHOSE MEASURES ARE GREATER THAN $\pi/2$ RADIANS. 0361

The value of $\sin(2\pi - \theta)$ for $0 < \theta < \frac{\pi}{2}$ is the same as 1092

a. $\sin\theta$
*b. $-\sin\theta$
c. $-\cos\theta$
d. $\sin 2\pi - \sin\theta$
e. none of the above

The value of cos $\left(\frac{\pi}{2} + \theta\right)$ for $0 < \theta \quad \frac{\pi}{2}$ is the same as 1093

a. $\cos \frac{\pi}{2} + \cos \theta$

b. $-\cos \theta$

c. $\sin \theta$

*d. $-\sin \theta$

e. none of the above

Which of the following represents a number equivalent to 1094

$\sin \frac{-37\pi}{12}$

*a. $\sin \frac{\pi}{12}$

b. $-\sin \frac{\pi}{12}$

c. $-\cos \frac{11\pi}{12}$

d. $\sin \frac{11\pi}{12}$

e. none of the above

$[\sin (2k + 1) \frac{\pi}{2} + x] = (-1)^k \cos x$; is true for 1095

a. all values of k and x
*b. for k an integer and x a real number
c. even values of k and $x \in R$
d. integral values of k and x
e. none of the above

Which of the following represents a number equivalent to $\cos - \frac{28\pi}{12}$ 1096

a. $\cos\left(-\frac{\pi}{3}\right)$

b. $\cos\left(\frac{\pi}{3}\right)$

c. $\sin\left(\frac{\pi}{6}\right)$

*d. all of the above

e. none of the above

THE STUDENT DEMONSTRATES HIS ABILITY TO USE LOGARITHMS OF THE VALUES OF TRIGONOMETRIC FUNCTIONS BY CHOOSING THE CORRECT VALUE OF A GIVEN EXPRESSION. 0135

Use logarithms to find 122 tan $50^\circ\ 00'$ 0365

a. 140.2
b. 143.6
c. 147.2
*d. 145.4

Use logarithms to find $\cot \dfrac{35^\circ\ 00'}{\tan 25^\circ\ 00'}$ 0366

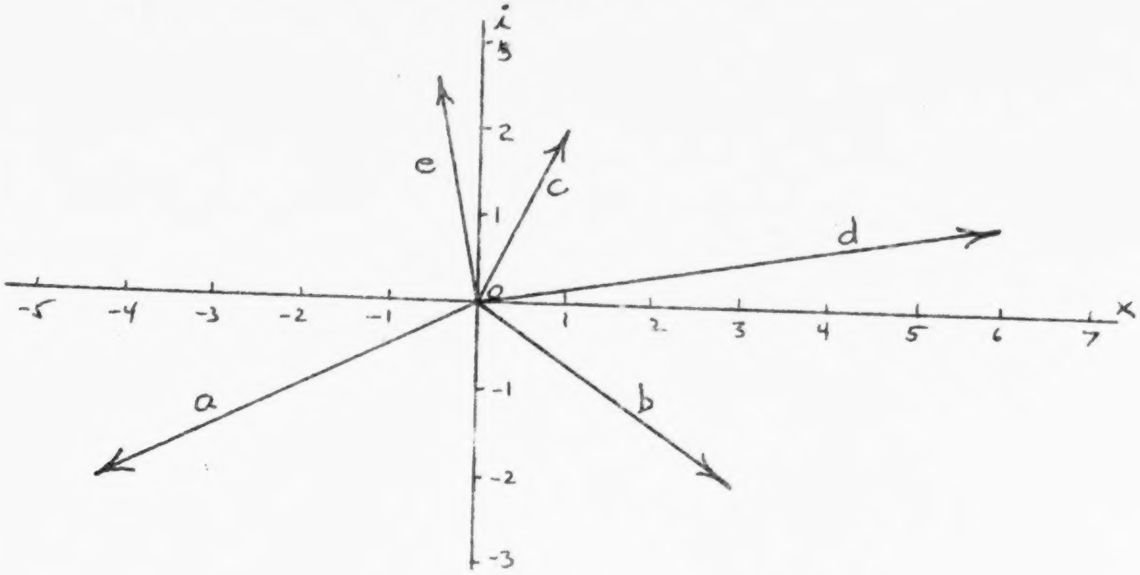
*a. 3.063
b. 3.124
c. 3.048
d. 3.129

Use logarithms to find the measure of θ given $\cos \theta = \dfrac{4.930}{8.750}$ 0367

a. $\theta = 55^\circ\ 40'$
b. $\theta = 55^\circ\ 45'$
c. $55^\circ\ 41'$
*d. $55^\circ\ 42'$

VECTORS

THE STUDENT CAN SHOW HIS UNDERSTANDING OF VECTOR ROTATION BY REWRITING VECTORS DIAGRAMMED IN GRAPHS AS VECTORS WRITTEN IN STANDARD FORM AND ALSO AS NUMBERS. 0393



*d [6, 1] is the standard form of writing the vector ____. 1543

*b [3, - 2] is the standard form of writing the vector ____. 1544

*c 1 + 2 i is the number associated with vector ______. 1545

*e [- 1, 5] is standard form of writing the vector ____. 1546

*a - 4 + (- 2 i) is the number associated with vector ____. 1547

*d 6 + i is the number associated with vector ____. 1548

*e - 1 + 5 i is the number associated with vector ____. 1549

*a [- 4, - 2] is the standard form of the vector _____. 1550

THE STUDENT WILL BE ABLE TO APPLY THE DEFINITIONS ASSOCIATED WITH THE TRIGONOMETRIC FUNCTIONS TO DETERMINE THE MAGNITUDE, AMPLITUDE, AND COMPONENTS OF VECTORS IN THE COORDINATE PLANE. 0256

Given $\theta = 45^{\circ}$, $r = 4$, then $x =$ 0950

a. 2
b. 4
*c. $2\sqrt{2}$
d. $2\sqrt{3}$

The reference angle of $\theta = 247^{\circ}$ is ______. 0951

*a. 67
b. 23
c. 47
d. 113

$\cos 196^{\circ} =$ ________ 0952

a. $\sin 16^{\circ}$
*b. $-\sin 74^{\circ}$
c. $\cos 16^{\circ}$
d. $-\cos 74^{\circ}$

Given $(x,y) = (\quad 3, -1)$, then $\theta =$ __________ 0953

a. 30°
b. 300°
c. 315°
d. 120°
*e. none of the above

Given $(x,y) = (7, -9)$ then $r =$ ________ 0954

a. $4\sqrt{2}$
b. $8\sqrt{2}$
c. $\sqrt{110}$
d. $2\sqrt{30}$
*e. none of the above

Given : $r = 3$, $\theta = 78^\circ$, find the y component of the vector (x,y) 0955
($\sin 78^\circ = .9781$)
($\cos 78^\circ = .2079$)

- *a. 2.9343
- b. 2.34
- c. .6237
- d. .36

THE STUDENT CAN SHOW HIS UNDERSTANDING OF THE WAY VECTORS ARE WRITTEN BY IDENTIFYING A VECTOR EXPRESSED IN STANDARD FORM. 0390

Which of the following is a vector written in standard form? 1538

- a. $-3 + 2i$
- b. $(-3, 2)$
- c. $\{-3, 2\}$
- *d. $[-3, 2]$

Which of the following is a vector written in standard form? 1539

- a. $(7, -8)$
- *b. $[7, -8]$
- c. $\{7, -8\}$
- d $7 + (-8i)$

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO UNDERSTAND THE RELATIONSHIP BETWEEN A VECTOR WRITTEN AS AN ORDERED PAIR AND A VECTOR WRITTEN WITH ITS NORM AND DIRECTION ANGLE BY CHANGING VECTORS FROM ONE FORM TO THE OTHER. 0552

The norm and direction angle of the vector $v = (-3, 1)$ is 2005

- a. $\|v\| = 2$, $\theta = \pi/6$
- b. $\|v\| = 2$, $\theta = \pi/3$
- *c. $\|v\| = 2$, $\theta = 5\pi/6$
- d. $\|v\| = 2$, $\theta = 2\pi/3$

The norm and direction angle of the vector $v = (-1,0)$ is 2006

- *a. $\|v\| = 1,\ \theta = \pi$
- b. $\|v\| = 1,\ \theta = \pi/2$
- c. $\|v\| = 1,\ \theta = 3\pi/2$
- d. $\|v\| = 1,\ \theta = 2\pi$

The norm and direction angle of vector $= (-4,\ 2,\ -4\ 2)$ is 2007

- a. $\|v\| = 8,\ \theta = \pi/4$
- b. $\|v\| = 8,\ \theta = -\pi/4$
- c. $\|v\| = 8,\ \theta = 3\pi/4$
- *d. $\|v\| = 8,\theta = 5\pi/4$
- e. $\|v\| = 8,\ \theta = 7\pi/4$

The vector v, where $v = 2$ and $\theta = \pi/6$ written as an ordered pair is 2008

- *a. $(\sqrt{3},\ 1)$
- b. $(1,\ \sqrt{3})$
- c. $(\sqrt{3}/2,\ 1/2)$
- d. $(1/2,\ \sqrt{3}/2)$
- e. $2\sqrt{3},2)$

The vector v, where $v = 5$ and $\theta = 120$, written as an ordered pair is 2009

- a. $(5/2,\ -5\sqrt{\frac{3}{2}})$
- b. $\left(\frac{-5\sqrt{3}}{2},\ \frac{5}{2}\right)$
- c. $\left(\frac{-5}{2},\ \frac{-5\sqrt{3}}{2}\right)$
- d. $\left(\frac{5}{2},\ \frac{-5\sqrt{3}}{2}\right)$
- *e. $\left(\frac{-5}{2},\ 5\sqrt{\frac{3}{2}}\right)$

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE NORM AND DIRECTION ANGLE OF A VECTOR BY COMPUTING THEM. 0605

Find the Norm of the vector (a,b). 2151

a. $a^2 + b^2$

b. $a + b$

*c. $\sqrt{a^2 + b^2}$

d. $|a + b|$

Find the vector with Norm = 5 and direction angle of 330°. 2152

a. $(\sqrt{3}/2, -1/2)$

b. $(-5\sqrt{3}/2, 5/2$

c. $(-\sqrt{3}/2, 1/2)$

*d. $(5\sqrt{3}/2, -5/2)$

THE STUDENT DEMONSTRATES HIS ABILITY TO USE VECTORS TO SOLVE WORD PROBLEMS BY CHOOSING THE CORRECT RESULTANT VECTOR, GIVEN THE COMPONENTS. 0137

Find the resultant vector of a force 130 lbs. to the left and 20 lbs. up. Express angle measures to the nearest degree and magnitudes to the nearest unit. 0373

a. a force of 130 lbs. at 157°

*b. a force of 132 lbs. at 171°

c. a force of 132 lbs. at 162°

d. a force of 128 lbs. at 152°

Find the resultant vector of velocities of 20m.p.North and 30 m.p.h. West. Express angular measures to the nearest degree and magnitudes to the nearest unit. 0374

*a. a velocity of approx. 36 m.p.h. at 304°

b. a velocity at approx. 21 m.p.h. at 326°

c. a velocity at approx. 18 m.p.h. at 326°

d. a velocity at approx. 26 m.p.h. at 300°

If P is a point 17 units from the origin and having a position angle of 50°, approximate to tenths the horizontal and vertical vector components. 0375

a. (8.6, 12.3)
b. (10.9, 8.6)
c. (12.3, 18.6)
*d. (10.9, 13.0)

THE STUDENT WILL DEMONSTRATE HIS KNOWLEDGE OF THE INNER PRODUCT OF TWO VECTORS BY COMPUTING IT. 0606

Given $V_1 = (1, 2)$ and $V_2 = (3, -4)$, what is the value of $V_1 \cdot V_2$? 2153

a. (3, -8)
*b. -5
c. 11
d. (-4, 6)

If V_1 and V_2 are vectors with Norms 7 and 12, and Direction angles 30° and 150°, respectively, find $V_1 \cdot V_2$. 2154

a. -84
b. +42
*c. -42
d. +84
e. $-42\sqrt{3}$

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF THE USE OF INNER PRODUCT VALUES IN SOLVING PROBLEMS BY FINDING THE RELATION BETWEEN INNER PRODUCT VALUES. 0607

Given $V_1 = (3, 4)$ and $V_2 = (-3, 5)$ Find V_3 if $V_1 \cdot V_3 = -12$ and $V_2 \cdot V_3 = 3$. 2155

a. (-1, -9/4)
b. (-1, 0)
*c. (-8/3, - 1)
d. (-2/3, -1)

If $V_2 = 3V_1$, which statement describes the relation between $V_1 \cdot V_3$ and $V_2 \cdot V_3$? 2156

a. $V_1 \cdot V_3 > V_1 \cdot V_3$
b. $V_1 \cdot V_3 = 3(V_2 \cdot V_3)$
*c. $V_1 \cdot V_3 = \frac{1}{3}(V_2 \cdot V_3)$
d. $V_1 \cdot V_3 = V_2 \cdot V_3$

If $V_1 = 2V_2 = 3V_3$, which statement describes the relation between $V_1 \cdot V_3$ and $V_2 \cdot V_3$? 2157

a. $V_1 \cdot V_3 = V_2 \cdot V_3$
b. $V_1 \cdot V_3 > V_2 \cdot V_3$
c. $V_1 \cdot V_3 < V_2 \cdot V_3$

WORD PROBLEMS

THE STUDENT WILL BE ABLE TO TRANSLATE WORD PHRASES INTO OPEN PHRASES IN CHOOSING THE OPEN PHRASE THAT REPRESENTS A GIVEN WORD PHRASE. (4) 0010

Select the open phrase that best describes the word phrase "One less than five times a number". 1416

a. 1 - 5n
b. 5 - n
c. n - 5
*d. 5n - 1

Select the open phrase that best describes the word phrase "The difference between 7 and twice a number". 1417

a. 2n - 7
b. n - 7
*c. 7 - 2n
d. 2 - 7n

Select the open phrase that best describes the word phrase "Three more than twice the number". Let n represent the number 1418

a. 3n + 2
*b. 2n + 3
c. n + 3
d. 3n + 2n

Select the open phrase that best describes the word phrase "The quotient of triple a number and two decreased by 7". Let n represent the number. 1419 *a. $\frac{3n}{2} - 7$

b. $\frac{2}{3n} \quad -7$

c. $7 + \frac{3n}{2}$

d. $7 - \frac{3n}{2}$

THE STUDENT WILL BE ABLE TO TRANSLATE OPEN PHRASES INTO WORD PHRASES BY CHOOSING THE WORD PHRASE THAT REPRESENTS A GIVEN OPEN PHRASE. (2) 0011

Select the word phrase that best describes the open phrase $3n + 1$ 1420

a. Three times a number decreased by one
b. Twice a number increased by one
*c. The sum of one and three times a number
d. One more than 3 and a product

Select the word phrase that best describes the open phrase $2(n + 3)$ 1421

a. The sum of twice a number and three
*b. Twice the sum of a number and three
c. The product of a number and two increased by three
d. Three more than twice a number

THE STUDENT DEMONSTRATES HIS ABILITY TO TRANSLATE WORD PROBLEMS INTO ALGEBRAIC EQUATIONS BY SELECTING THE CORRECT EQUATION FROM A GROUP OF FOUR POSSIBILITIES. (2) 0039

The square of two consecutive integers differ by 103. What is the algebraic equation that represents this sentence? 0028

a. $y^2 + (y + 1)^2 = 103$

b. $y^2 + (y^2 + 1) = 103$

c. $y^2 - (y^2 + 1) = 103$

*d. $y^2 - (y - 1)^2 = 103$

The product of two consecutive integers exceeds the square of the smaller integer by 13. Translate the above into one of the algebraic equations below. 0029

a. $n (n - 1) - n = 13$

*b. $n (n + 1) - n^2 = 13$

c. $n (n + 1) + n^2 = 13$

d. $n (n + 1) - n = 13$

THE STUDENT DEMONSTRATES HIS ABILITY TO TRANSLATE A WORD PROBLEM INTO A POLYNOMIAL EQUATION BY SELECTING THE CORRECT EQUATION FROM A LIST OF FOUR POSSIBILITIES. (2) 0051

A rectangle is 5 feet longer than it is wide. The area of the rectangle is 66 square feet. What is the equation? 0073

*a. $x^2 + 5x = 66$

b. $x^2 + 5 = 66$

c. $x^2 = 66$

d. $x(x^2 + 5) = 66$

Select the two consecutive odd integers the sum of whose squares is 202. 0074

a. $x^2 + (x + 2) = 202$
$x = 19$
$x + 2 = 21$
Or
$x = 19$
$x + 2 = 21$

*b. $x^2 + (x + 2)^2 = 202$
$x = -11$
$x + 2 = -9$
$x = 9$
$x + 2 = 11$

c. $x^2 + (x + 2)^2 = 202$
$x = 13$
$x + 2 = 15$
$x = 13$
$x + 2 = 15$

d. $x^2 + (x + 1)^2 = 202$
$x = -9$
$x + 2 = -7$
$x = -9$
$x + 2 = -7$

IN PERCENT MIXTURE PROBLEMS, WORK PROBLEMS, AND MOTION PROBLEMS, THE STUDENT DEMONSTRATES HIS ABILITY TO TRANSLATE A WORD PROBLEM FROM EACH TYPE INTO AN ALGEBRAIC EQUATION BY CHOOSING THE CORRECT EQUATION. (4) 0060

A man invests $10,000, part at 4 per cent, and the remainder at 6 per cent. From this he receives $500 annually. What is the equation from which you could find the amount invested at each rate? 0101

a. $\frac{4}{100}x = 500$

b. $\frac{6}{100}x = 500$

*c. $\frac{4}{100}x + \frac{6}{100}(10,000 - x) = 500$

d. $500 - (10,000 - x)\frac{6}{100} = \frac{4}{100x}$

A solution contains 80 grams of sugar in 400 grams of starch. What is the equation to show how much sugar must be added to make a 50% sugar solution. 0102

a. $(480)\frac{50}{100} = x$

b. $80 + x = \frac{50}{100}(480)$

c. $(480 - x)\frac{50}{100} = 80$

*d. $(480 + x)\frac{50}{100} = 80 + x$

One pipe can fill a tank in 5 hrs. A second pipe can fill it in 3 hrs. What would be the equation to find out how long it would take both pipes to fill the tank? 0103

a. $\frac{1}{5}R = 1$

*b. $\frac{1}{5}R + \frac{1}{3}R = 1$

c. $\frac{1}{3}R = 1$

d. $\frac{1}{5}R - \frac{1}{3}R = 1$

Leo can swim 2 miles per hour in still water. After he swims down a river for a quarter of a mile, returning takes three time as long as swimming downstream. What is the equation that would enable you to find the rate of the current? 0104

a. $.25 = 3\left(\frac{.25}{2 +}\right)$

b. $\frac{.25}{2 - c} = 39.25$

c. $25(2 + c) = 75$

*d. $\frac{.25}{2 - c} = \frac{3(.25)}{2 + c}$

THE STUDENT IS ABLE TO TRANSLATE A WORD PROBLEM INTO TWO EQUATIONS IN TWO UNKNOWNS BY SELECTING THE CORRECT PAIR OF EQUATIONS FOR GIVEN CONDITIONS. (4) 0074

The sum of the digits of a two-digit numeral is 13. If 27 is added to the number, the result is the number with its digits interchanged. What are the two equations that you would have to solve simultaneously? 0145

*a. $n + y = 13$
$n - y = -3$

b. $10n + y = 27$
$10y + n = 13$

c. $n - y = 13$
$10n + y = 27$

d. $n - y = 27$
$10y + n = 13$

A motorboat covers 6 miles in 45 minutes. The return trip takes 1½ hours. What are the equations that you would use to find the boat speed in still water. 0146

a. $\frac{3}{4}(x + y) = 6$
$3x + 3y = 24$

*b. $x + y = 8$
$x - y = 4$

c. $3x + y = 6$
$x + y = 4$

d. $x - y = 8$
$4x + 2y = 4$

A man is 5 times as old as his son. In five years he will be 3 times as old as his son will be. Which of the following equations could you solve to find the age of the father and son? 0147

a. $x = 5y$
$x + 5 = 15y + 5$

b. $x = 5y$
$x + 5 = 15y + 15$

*c. $x = 5y$
$x + 5 = 3y + 15$

d. $x = 5y$
$x + 5 = 3y$

The denominator is 3 more than the numerator. If each is increased by 1, the value of the resulting fraction is $\frac{2}{3}$. Which of the following pairs of equations could you solve to find the original fraction? 0148

*a. $y = x + 3$
$\frac{x + 1}{y + 1} = \frac{2}{3}$

c. $y + 3 = x$
$\frac{x + 1}{y + 1} = \frac{2}{3}$

b. $y = x$
$\frac{x + 1}{y} = \frac{2}{3}$

d. $\frac{x + 1}{y + 1} = \frac{2}{3}$
$y = x + 1$

THE STUDENT WILL BE ABLE TO TRANSLATE MATHEMATICAL LANGUAGE INTO SYMBOLISM BY CHOOSING THE CORRECT REPRESENTATION FOR A GIVEN STATEMENT. (4) 0259

If two sides of a triangle are congruent, the angles opposite them are congruent. This is an example of 0962

a. $p \wedge q \rightarrow r$
b. $p \wedge q$
*c. $p \rightarrow q$
d. $p \vee q$

In an isosceles triangle, the bisector of the vertex angle bisects the base. This is an example of 0963

a. $p \vee q \rightarrow r$
b. $p \wedge \sim q \rightarrow r$
c. $p \rightarrow q$
*d. $p \wedge q \rightarrow r$

Given: "If two sides of a triangle are congruent, the angles opposite them are congruent" which implies "If two angles of a triangle are not congruent the sides opposite them are not congruent." In symbolic language this says: 0964

a. $\sim p \wedge \sim q \quad \rightarrow \quad p \vee q$

b. $p \vee q \quad \rightarrow \quad \sim q \wedge \sim p$

*c. $(p \rightarrow q) \quad \rightarrow \quad (\sim q \rightarrow \sim p)$

d. $p \rightarrow \sim q \quad \rightarrow \quad (q \rightarrow p)$

Proving triangles congruent by SAS is a use of which of the following forms of symbolism? 0965

*a. $p \wedge q \wedge r \rightarrow s$
b. $p \wedge q \vee r \rightarrow s$
c. $p \vee q \rightarrow r$
d. $p \vee q \vee r \rightarrow s$

THE STUDENT CAN DEMONSTRATE UNDERSTANDING OF ALGEBRAIC SYMBOLISM BY TRANSLATING NUMBER EXPRESSIONS IN WORDS INTO ALGEBRAIC SYMBOLS. (21) 0315

Match List I with List II so that the number expressions in words correspond to the algebraic symbols.

	List I	List II	
*d	the sum of m and 10	a. $m - 6$	801
*e	four times a number increased by 9	b. $6 - m$	802
*a	m diminished by 6	c. $8m - 3$	803
*c	8 times a number decreased by 3	d. $m + 10$	804
*b	6 diminished by m	e. $4m + 9$	805
		f. $6m - 3$	

If z represents a number, express the following algebraically.

	correct answers	
5 more than twice z	* $5 + 2z$	806
three times z diminished by 9	* $3z - 9$	807
1/2 of z increased by 2/3	* $1/2z + 2/3$	808
forty increased by 2/5 of z	* $40 + 2/5z$	809
$4/9z$ divided by 6	* $4/9z \div 6$	810

Instructions: Express the following algebraically

a. If John is x years old and Sally is 2/3 as old as John, then 811

1. Sally is_______years old $2/3\ x$ 812

2. The sum of their ages is________. $x + 2/3x$ or $1\frac{2}{3}\ x$

b. If a new hat costs n dollars and a new coat costs one and one-half times as much, then the hat and coat cost______ dollars. $N + 1\frac{1}{2}n$ or $2\frac{1}{2}n$ 813

c. If Jim weighs p lbs. and Sam weighs 40 lbs. more than Jim, then 814

1. Sam weighs______. $p + 40$

2. the two boys together weigh.________ $2p + 40$ 815

Instructions: Express the following algebraically

a. the number of feet in y yards is ________. $3y$ 816

b. the number of weeks in d days is ________. $\frac{d}{7}$ 817

c. the number of ounces in p pounds is ______. $16p$ 818

d. the number of yards in f feet is _______. $\frac{f}{3}$ 819

e. the number of eggs in d dozen is________. $12\ d$ 820

f. the number of miles John travels in t hours if his rate is 30 miles per hour is ________. $30\ t$ 821

THE STUDENT CAN TRANSLATE A VERBAL PROBLEM BY REWRITING THE VERBAL STATEMENT IN MATHEMATICAL SYMBOLS. (2) 0387

Directions: In the following questions identify only the equation necessary for the solution of the questions.

1. If three times the square of a certain number be increased by seven, the sum is twenty-two times the number. What is the number? 1531

a. $3(x^2 + 7) = 22x$

*b. $3x^2 + 7 = 22x$

c. $3(x + 7)^2 = 22x$

d. $9x^2 + 7 = 22x$

2. How wide a border must a farmer cut around the outside of a field of grain that is 20 yards wide and 80 yards long in order that he shall have cut one-fourth of the field of grain? 1532

*a. $(20-2x)(80-2x) = 3/4(20)(80)$

b. $(20+2x)(80+2x) = 3/4(20)(80)$

c. $(20-x)(80-x) = 3/4(20)(80)$

d. $(20+x)(80+x) = 3/4(20)(80)$

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO INTERPRET A PRACTICAL PROBLEM BY MATCHING AN EQUATION WITH ITS CORRESPONDING PROBLEM. 0477

Which problem below would be represented by the equation $3n + 5 = 20$? 1782

a. Three times a certain number is five more than 20. What is the number?
b. Three more than five times a certain number is 20. What is the number?
*c. Three times a certain number increased by five is 20. What is the number?
d. Three times the sum of a certain number and five is 20. What is the number?

Which problem below would be represented by the equation $7 - 2n = 21$? 1783

*a. Seven decreased by two times a number is 21. Find the number.
b. Twice a number decreased by seven is 21. Find the number.
c. Twice a number is seven less than 21. Find the number.
d. Seven less than twice a number is 21. Find the number.

Determine which equation below is the correct translation of the problem. 1784

"John is now 10 years older than Mary. Five years ago he was twice as old as Mary was then. How old is Mary now?" Let n represent Mary's age now.

a. $n + 10 = 2n$
b. $n + 10 - 5 = 2n$
c. $n + 5 = 2n - 5$
*d. $n + 5 = 2(n - 5)$
e. $n - 5 = 2(n - 5)$

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF WRITING ALGEBRAIC EQUATIONS BY TRANSLATING A WRITTEN PROBLEM INTO AN EQUATION. 0485

This is the only known story of Diophantus' (a Greek mathematician) life. 1802

"God granted him childhood for a sixth part of his life, and youth for a twelfth part. He was married after a seventh part more, and five years after his marriage God granted him a son. After attaining the measure of half his father's life, cruel fate overtook his son [that is, he died], thus leaving Diophantus four years life."

Let x be number of years in Diophantus' age.
Which equation represents the number of years that Diophantus lived?

*a. $1/6x + 1/12x + 1/7x + 1/2x + 5 + 4 = x$
b. $1/6 + 1/12 + 1/7 + 5/x + 4/x = 1$
c. $1/6 + 1/12 + 1/7 + 5/x + 4/x = x$
d. $1/6 + 1/12 + 1/7 + 5/x + x/2 + 4/x = 1$

THE STUDENT WILL RECOGNIZE A VARIABLE IN A PROBLEM SITUATION, BE ABLE TO SUBSTITUTE A NUMBER FOR IT, AND BE ABLE TO WRITE THE DOMAIN OF THE VARIABLE, THUS DEMONSTRATING KNOWLEDGE OF THE USE OF VARIABLES. 0217

Which of the following expressions does NOT contain a variable? 1125

a. $3x + 4$
*b. $2\pi - 3$
c. $2x + y$
d. $\frac{4a}{11}$
e. none of these

If the variable in the expression $3x + 2$ is replaced by the number 4 the value of the expression will be 1126

*a. 14
b. 18
c. 9
d. 10
e. none of these

If notebooks sell for 80¢ each, then the expression 80n represents the cost in cents of n notebooks which Tom bought. What is the domain of n? 1127

a. $\{n \mid n > 0\}$
b. $\{n \mid n \geq 0\}$
c. $\{n \mid n > 0$, n is a rational number$\}$
*d. $\{n \mid n > 0$, n is an integer$\}$
e. none of these

If J represents Jim's age in years today, then the expression representing twice his age a year ago is 1128

*a. $2(J - 1)$
b. $2\ J - 1$
c. $2J + 1$
d. $2\ J + 2$
e. none of these

If 15 is divided by 2 less than a number n, the domain of the number n is 1129

a. $\{n \mid n \geq 0\}$
b. $\{n \mid n \neq 0\}$
*c. $\{n \mid n \neq 2\}$
d. $\{n \mid n > 0, n \neq 2\}$
e. none of these

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO UNDERSTAND THE RESTRICTIONS THAT MUST BE PUT ON THE VARIABLES USED TO SOLVE PROBLEMS BY SELECTING THE CORRECT SET OF NUMBERS IN WHICH THE VALUE OF THE VARIABLE MUST BE FOUND. 0624

Muriel has $3.70 in dimes and quarters. If there are 25 coins in all, how many of them are dimes? The value of the variable used for the number of dimes must be a member of the set of 2226

*a. whole numbers.
b. integers.
c. rationals.
d. reals.

How much coffee worth \$0.84 a pound should be mixed with coffee worth \$1.02 a pound to produce a mixture worth \$0.96 a pound? The set of numbers in which the value of the variable must be found is 2227

a. whole numbers.
b. integers.
*c. rationals.
d. reals.

A training plane has airspeed of 100 M.P.H. On a windless day how many hours does the plane need for a trip, to a point 240 miles away? This answer is a member of the set of 2228

a. whole numbers.
b. integers.
*c. rationals.
d. reals.

Two numbers have a product of $3\sqrt{5}$. These numbers are members of the set of 2229

a. whole numbers.
b. integers.
c. rationals.
*d. reals.

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO ANALYZE FOR FACTS THAT ARE RELEVANT AND FACTS THAT ARE NOT RELEVANT IN A STORY PROBLEM BY CORRECTLY IDENTIFYING THE NONRELEVANT FACTS. 0473

What fact would you not need to find the cost of carpeting your bedroom floor? 1775

a. length of room
b. width of room
*c. height of room
d. cost of carpeting
e. area of room

What fact would you not need to find the cost of operating a car on a motor trip? 1776

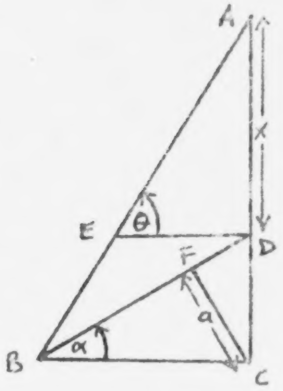
a. cost of one gallon of gasoline
b. gallons of gasoline consumed per day
c. days spent traveling
*d. hours spent driving per day
e. quarts of oil used on the trip

THE STUDENT CAN ANALYZE PROBLEM SOLUTIONS BY STATING IN THE PROPER ORDER, WHICH OPERATION TO USE IN ORDER TO SOLVE PROBLEMS. 0320

Directions: Match List I with List II - If more than one operation is involved, choose the answer in List II with the proper order, as well as the correct operations.

	List I	List II	
*f	If a=b, then $\frac{a}{b} = 1$	a. factor, ÷	0849
*d	5-3•2 ÷ 3	b. ÷, x, -	0850
*h	$(x + 3)^2 + 5$	c. +, ÷	0851
*c	$\frac{3x + 2x}{5}$	d. x, ÷ , -	0852
*b	7 - 3 ÷ 3 x 1	e. x, ÷	0853
*i	$(\sqrt{x + 3}\ )^2$	f. ÷	0854
*a	$\frac{x^2 + 6x}{x}$	g. -, ÷	0855
*j	3x + 2x = 15-5	h. square, +	0856
*d	7-3 + 8 x 2 ÷ 4	i. square	0857
*g	If 3x = x + 2 x = 1	j. +, -, ÷	0858

THE STUDENT WILL BE ABLE TO ANALYZE A PROBLEM SITUATION AND SELECT THE MOST DIRECT PROCEDURE FOR SOLUTION. 0360



Given the adjacent diagram with accompanying measures, write an expression for the measure of AD in terms of a, θ, and α.

m ∠ AED = θ
m ∠ DBC = α
$\overline{CF} = a$
$\overline{ED} \perp \overline{AC}$ at D
$\overline{BC} \perp \overline{AC}$ at C
$\overline{CF} \perp \overline{DB}$ at F
AD = x

Directions: Consider each of the alternatives below and circle that which is the most direct procedure for solution.

*a. apply the Law of Sines to △ABC 1091
b. apply the Law of Cosines to △ABC
c. use a proportion from △AED and △ABC
d. apply the Law of Sines to △BDE and then use △ADE
e. none of the above

THE STUDENT DEMONSTRATES HIS ABILITY TO SOLVE WORD PROBLEMS USING PROPORTION BY CHOOSING THE SOLUTION FOR A GIVEN WORD PROBLEM. 0027

If a man earned $26 for working 8 hours, how much would he earn if he worked 18 hours? 1463

a. $260.00
*b. $ 58.50
c. $102.22
d. $ 55.38

If the ratio of cattle to sheep is 4 to 3, how many sheep are there if there are 1200 head of cattle? 1464

*a. 900
b. 800
c. 1800
d. 1600

THE STUDENT CAN APPLY THE RULES OF INTEREST COMPUTATION ON A GIVEN SUM OF MONEY FOR A SPECIFIC AMOUNT OF TIME BY CHOOSING THE CORRECT AMOUNT OF INTEREST. 0029

What interest would be paid on $300 at the rate of 6% for a period of 9 months? 1469

a. $12.00
*b. $13.50
c. $18.00
d. $15.50

THE STUDENT WILL BE ABLE TO SET UP AND SOLVE CERTAIN TYPES OF WORD PROBLEMS BY CHOOSING THE CORRECT SOLUTION. 0206

John can shovel the snow from a sidewalk in 12 minutes, and James can do it in 18 minutes. How long will it take them to shovel the walk, if they work together? 0758

a. 5 minutes
b. 6 minutes
c. 6 5/7 minutes
*d. 7 1/5 minutes
e. none of the above

Judy can sew a dress in 8 hours, but she and a friend working together can sew the dress in 6 hours. How long would it take her friend working alone? 0759

a. 2 hours
b. 12 hours
c. 18 hours
*d. 24 hours
e. none of the above

An inlet pipe can fill a tank in 4 hours, while an outlet tank can empty the tank in 7 hours. If the tank is empty and both pipes are open, how long will it take to fill the tank? 0760

a. 3 hours
b. 5 2/5 hours
*c. 9 1/3 hours
d. 28 hours
e. none of the above
f. it never will get filled

One contractor can build a fireplace in 6 hours, while a second contractor can build it in 10 hours, and a third contractor can build it in 2 hours. How long would it take them working together to build the fireplace? 0761

a. 1 hour
*b. 1 7/30 hours
c. 1 6/7 hours
d. 2 hours
e. none of the above

One inlet can fill a tank in 3 hours while a second inlet pipe can fill a tank in 5 hours, and an outlet pipe can empty the tank in 4 hours. If all the pipes are opened at once, how long will it take to fill the tank? 0762

a. 60/14 hours
*b. 60/17 hours
c. 6-/21 hours
d. none of above
e. will never be filled

THE STUDENT DEMONSTRATES HIS ABILITY TO TRANSLATE A WORD PROBLEM INTO AN ALGEBRAIC SENTENCE OF ONE (OR TWO) VARIABLES WHEN HE CHOOSES THE CORRECT EQUATION. 0249

Three years from now Sue will be four times as old as Mary. Mary is 8 years old. How old is Sue? 1242
This problem translated into an algebraic sentence would be

a. $3 + s = 4m \quad m = 3$
b. $4m + 3 = s + 3 \quad m = 8$
c. $s - 3 = 4m \quad m = 8$
*d. $4(m + 3) = s + 3 \quad m = 8$
e. none of the above

THE STUDENT CAN TRANSLATE VERBAL PROBLEMS INTO MATHEMATICAL SYMBOLS BY SHOWING EVIDENCE OF THE CORRECT NUMERICAL SOLUTION TO THE ORIGINAL QUESTION. 0403

When a ladder 24 ft. long rests against the vertical wall of a building, its top is 16 ft. farther from the base of the building than is it's foot. How high on the wall does the ladder reach? (Leave answer in simple radical form). 1573

a. $-8 + 4\sqrt{14}$
*b. $8 + 4\sqrt{14}$
c. $8\sqrt{5}$
d. $8 - 4\sqrt{14}$

Determine a linear equation expressing the condition that the point (x, y) is equidistant from the points $(3, 4)$ and $(5, 2)$. 1574

a. $x + y = -1$
b. $x + y = 1$
*c. $x - y = 1$
d. $x - y = -1$

THE STUDENT CAN ANALYZE VERBAL PROBLEMS THAT LEAD TO A SYSTEM OF EQUATIONS BY IDENTIFYING THE CORRECT SOLUTION SET OF THE VERBAL STATEMENT. 0409

The difference of two numbers is 6 and the difference of their squares is 96. What are the numbers? 1597

a. 8 and 2
b. 9 and 3
c. 10 and 4
*d. 11 and 5

Find two numbers whose product is 2y and the sum of whose squares is 73. 1598

a. 8 and -3; 8 and 3
*b. -8 and -3; 8 and 3
c. -8 and 3; 8 and 3
d. $\emptyset$

THE STUDENT CAN TRANSLATE VERBAL PROBLEMS INTO MATHEMATICAL SYMBOLS BY WRITING THE CORRECT ANSWER TO THE VERBAL QUESTION. 0410

Find an equation of the line passing through the point $(7, -5)$ and perpendicular to the graph of $9x - 3y = 4$. 1599

a. $3x - y = 26$
b. $3x + y = 26$
*c. $x + 3y = -8$
d. $x - 3y = 8$

Find an equation of the line passing through the point (3, 5) and parallel to the graph of $3x + y = 11$. 1600

a. $x - 3y = -12$
*b. $3x + y = 14$
c. $3x - y = 14$
d. $x + 3y = 12$

THE STUDENT WILL DEMONSTRATE HIS UNDERSTANDING OF THE EARTH'S MEASUREMENTS BY INDICATING THE CORRECT ANSWER TO PROBLEMS DEALING WITH LOCATION. 0445

Directions: Choose the correct answer for the following problems.

How far and in what direction does a person travel if he gets 8 hours sleep between 10 p.m. and 4 a.m.? 1718

*a. 30 degrees west
b. 30 degrees east
c. 40 degrees west
d. 60 degrees west
e. 60 degrees east

If the altitude of the star Polaris was 15 degrees and you moved west 45 degrees its altitude would be 1719

a. 3 degrees
*b. 15 degrees
c. 30 degrees
d. 45 degrees
e. 60 degrees

Where would you be if you read the altitude of the star Polaris as 95° degrees? 1720

*a. 85 degrees north of the equator.
b. 5 degrees north of the equator.
c. 5 degrees south of the equator.
d. 85 degrees south of the equator.
e. at the equator.

How much time has elapsed if you observe that a star which was directly over your head is now just above the western horizon? 1721

a. 24 hours
b. 12 hours
c. 8 hours
*d. 6 hours
e. 4 hours

THE STUDENT WILL APPLY HIS KNOWLEDGE OF MAXIMUM AND MINIMUM POINTS BY FINDING MAXIMUM AND MINIMUM VALUES IN VERBAL PROBLEMS. 0536

A real estate operator estimates that the monthly profit P_2in dollars from a building s stories high is given by $P = -2s^2 + 88S$. What height building would he consider most profitable. 1962

a. 44 stories
*b. 22 stories
c. 88 stories
d. The more stories on his building, the more his profit.

A watermelon grower wishes to ship as early as possible in the season to catch the highest prices. He can ship now 6 tons at a profit of $4 a ton. By waiting he estimates he can add 3 tons per week to his shipment, but the profit will be reduced $1/3 per ton per week. How long should he wait for maximum profit? 1963

a. ship immediately
b. 12 weeks
c. 10 weeks
*d. 5 weeks
e. 6 weeks

THE STUDENT WILL DEMONSTRATE HIS ABILITY TO APPLY CORRECT PROCEDURES IN SOLVING SYSTEMS OF EQUATIONS BY SOLVING VERBAL PROBLEMS. 0544

Suppose you have a combination of ten coins, consisting of nickels, dimes and quarters, whose total value is $1.25. The number of solutions for the number of each coin you have is 1986

a. 1
*b. 2
c. none
d. more than two but less than 10
e. infinitely many

A box with a volume of 80 cubic inches is to be constructed by cutting 2-inch squares from a rectangular piece of cardboard and then bending up the sides and tying a piece of string around them to hold them up. If the piece of string required is 27 inches long (including one inch for making the knot), the dimensions of the original piece of cardboard are 1987

a. 10 in. by 7 in.
b. 5 in. by 8 in.
*c. 9 in. by 12 in.
d. 8 in. by 14 in.
e. 4 in. x 10 in.

THE STUDENT WILL BE ABLE TO DEMONSTRATE HIS ABILITY TO APPLY PROCEDURES FOR EQUATIONS BY SOLVING VERBAL PROBLEMS. 0546

A speeder going 75 miles per hour passes a state trooper parked by the side of the thruway. The trooper gives chase; within 1 1/2 minutes he has reached a speed of 90 m.p.h. and has gone 0.15 miles. If he continues at his speed, how long does it take him to overtake the speeder? 1991

a. .115 hr.
b. .1 hr.
*c. .14 hr.
d. .025 hr.

Don usually drives from his home to the college in 12 minutes. When rushed, he increases his average speed by 5 miles per hour and makes the trip in 10 minutes. How far does Don live from the college? 1992

a. 25 miles
*b. 5 miles
c. 4 miles
d. 6 miles
e. 10 miles

If a team in a baseball league wins 15 out of its first 20 games, how many additional games will it have to play where it wins only one half of the time until it has a record of 0.600 wins? 1993

a. 15
b. 20
*c. 30
d. 50

An automobile 16 feet long overtakes a truck that is 28 feet long and is traveling 30 miles per hour. At what rate must the automobile travel to pass the truck in 4 seconds? 1994

a. 30 mph
b. 32.5 mph
c. 35 mph
*d. 37.5 mph
e. 40 mph

A and B can do a certain task if both work together 3 days and A then works alone one day; B and C can do the task if they work together 4 days and B then works alone 2 days. It would take C twice as long as it would A to do it alone. How long would it take B working alone? 1995

a. 6 days
*b. 9 days
c. 12 days
d. 15 days
e. 18 days

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